2213

ELECTRICAL REVIEW

JANUARY 1958 PRICE 1s 6d

N-S VARIABLE SPEED A.C. MOTORS FOR PUMPING STATIONS

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JAN 29 1958

Four 320/60 h.p., 660/370 r.p.m., N-S variable speed a.c. motors, with L.S.E. control panels, driving Allen pumps at the Norton pumping station of Liverpool Corporation.
(*Corporation Water Works Engineer, Mr. J. H. T. Stilgoe, M.I.C.E., M.I.W.E.*)

Efficient control of output by speed variation, with adaptability to any form of automatic control, are characteristics which have led to the adoption of N-S variable speed a.c. motors for pumping drives totalling tens of thousands of horse-power.

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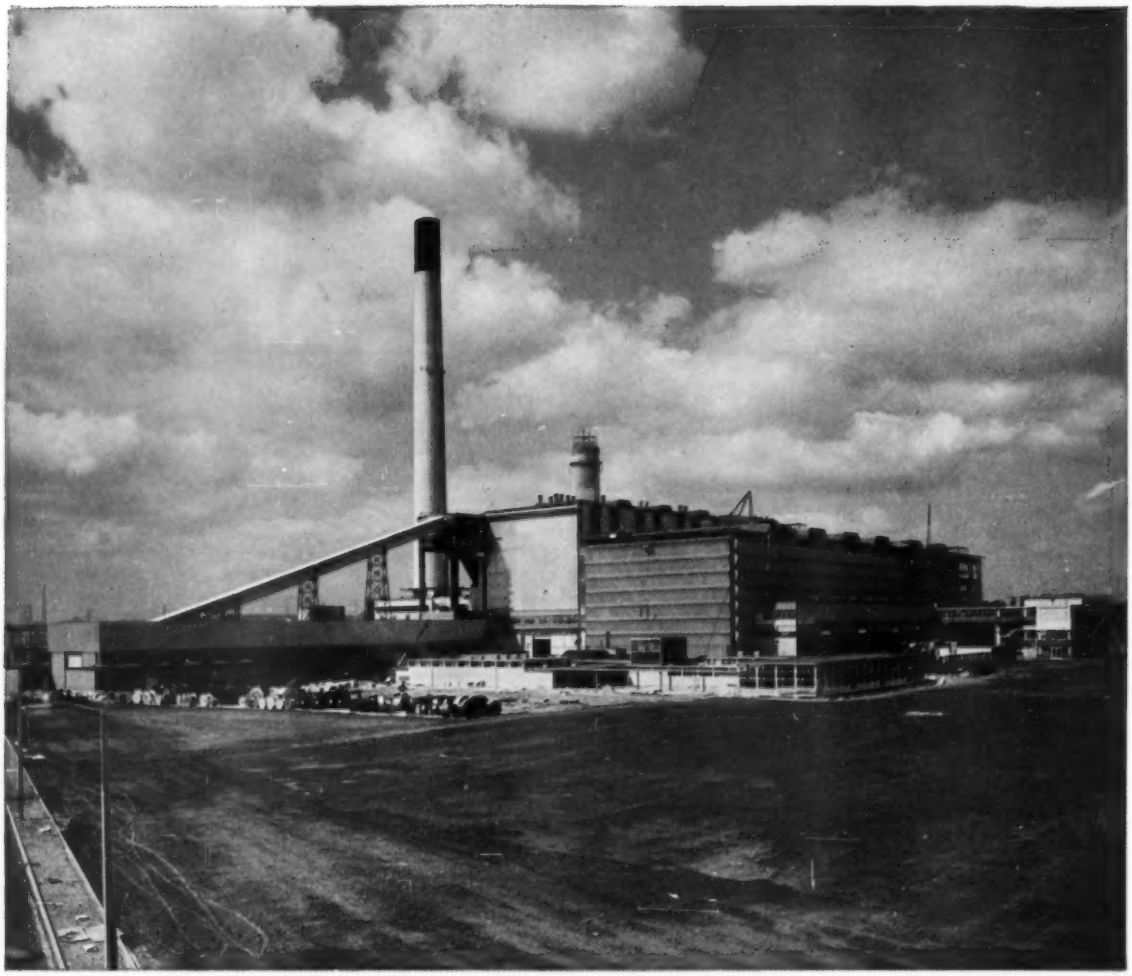

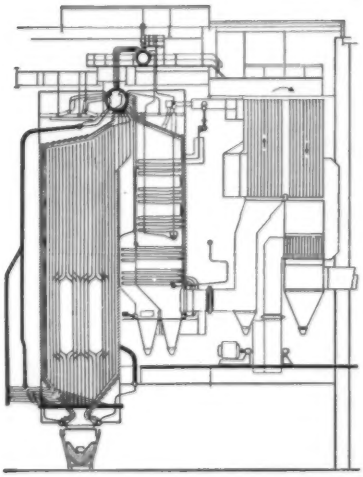

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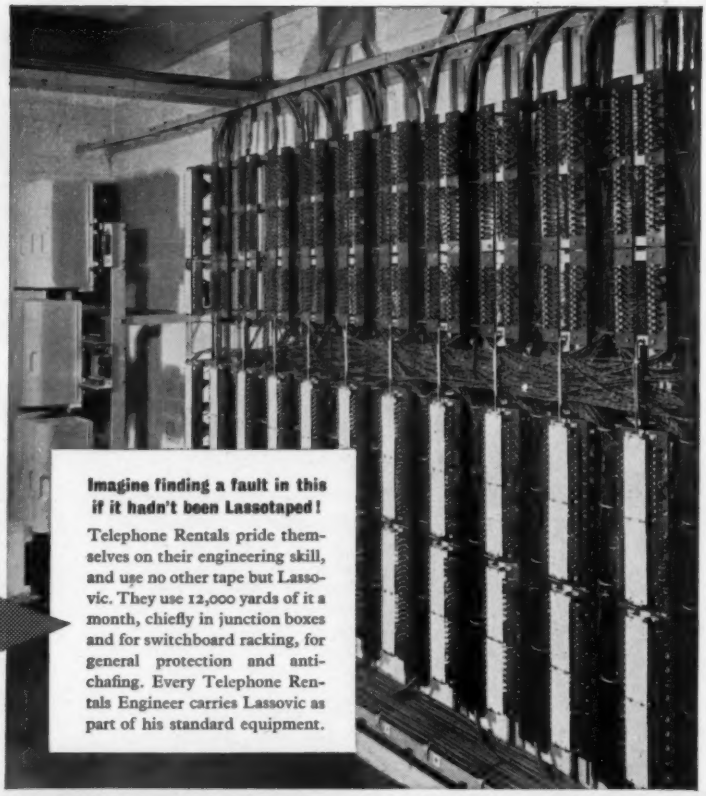

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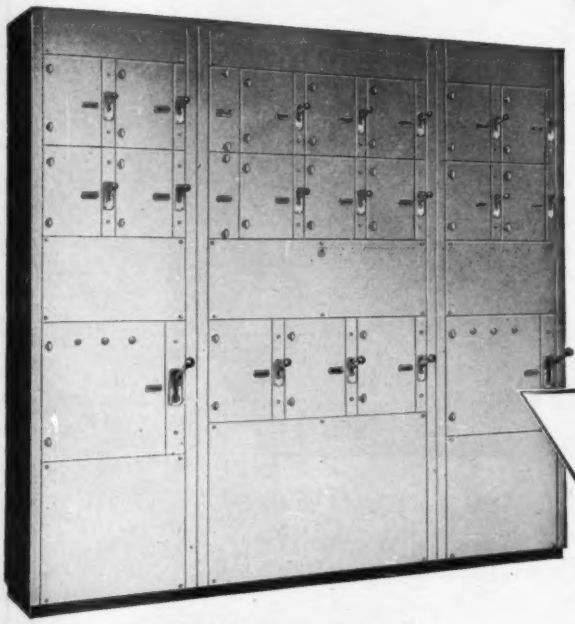

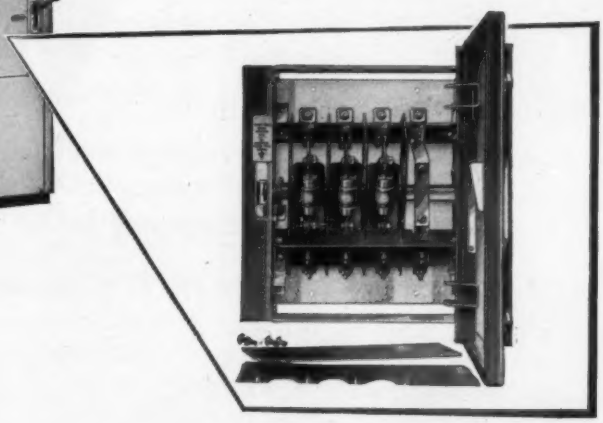

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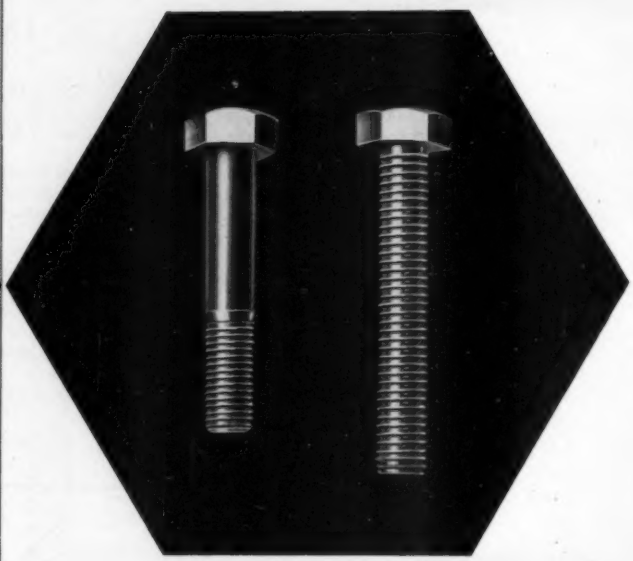

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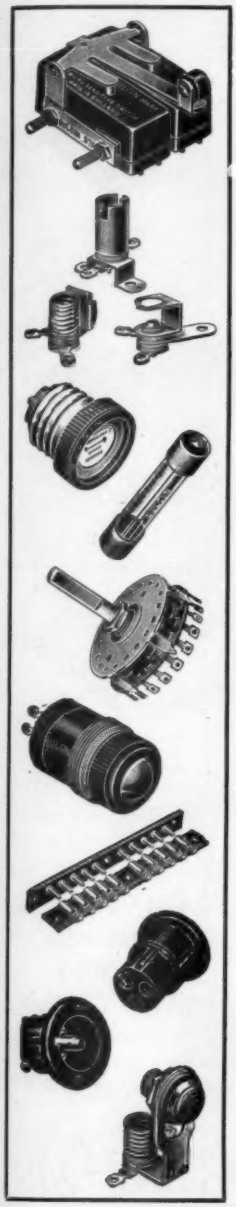

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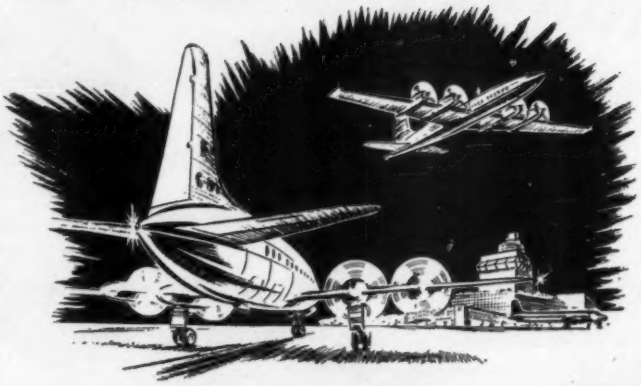

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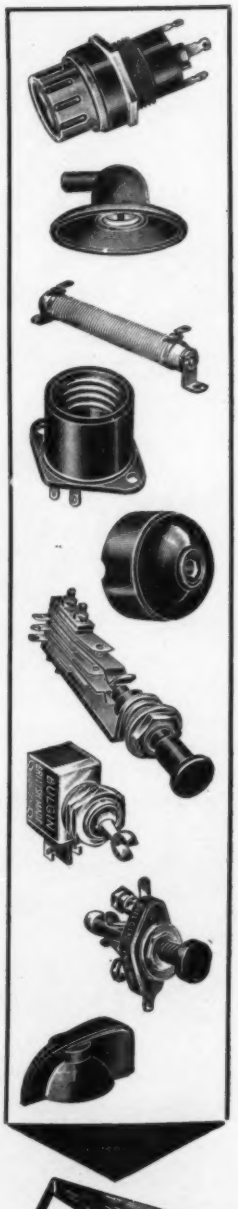

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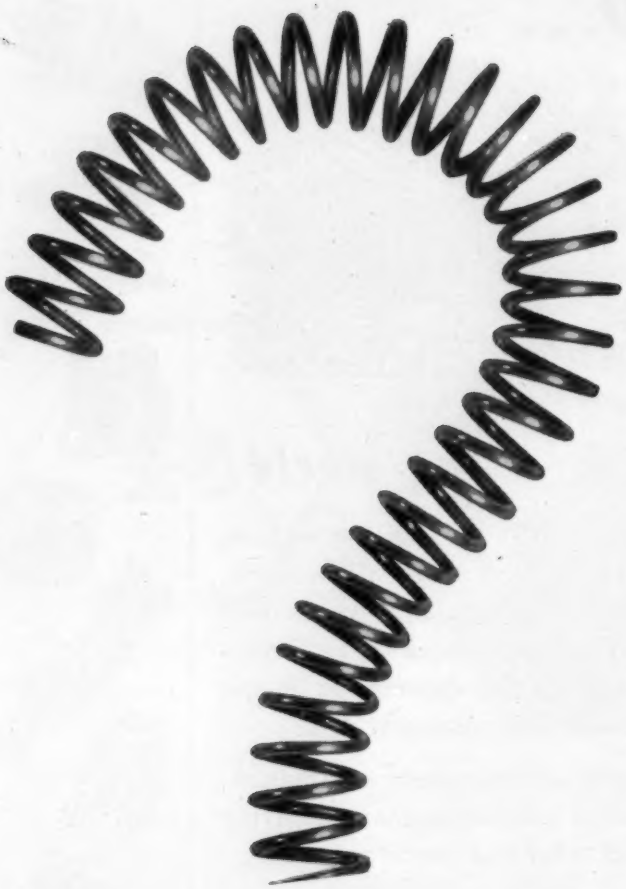

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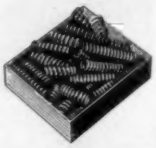

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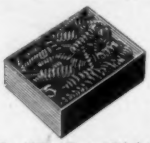

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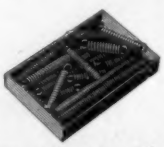

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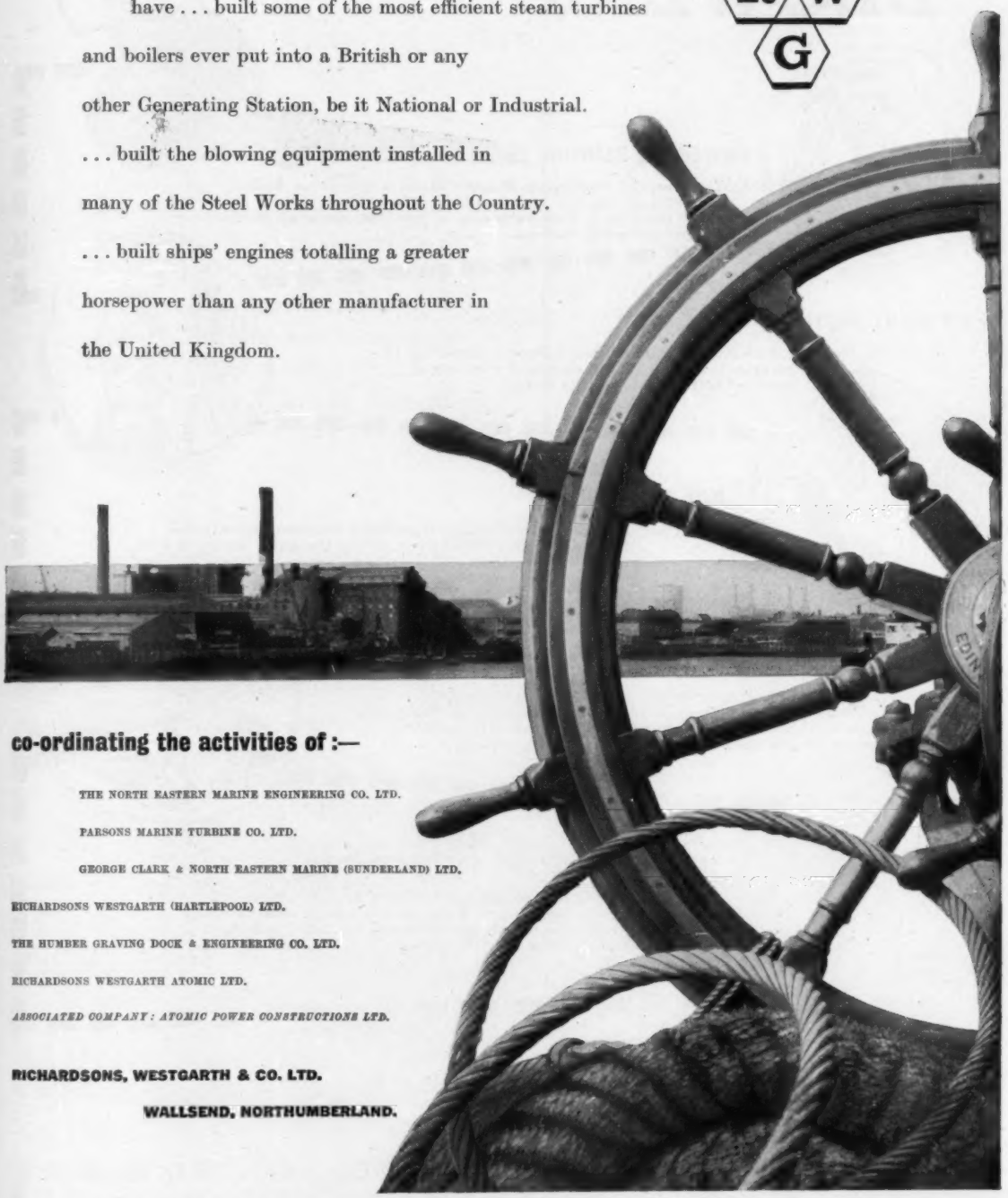

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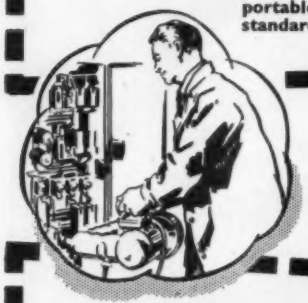

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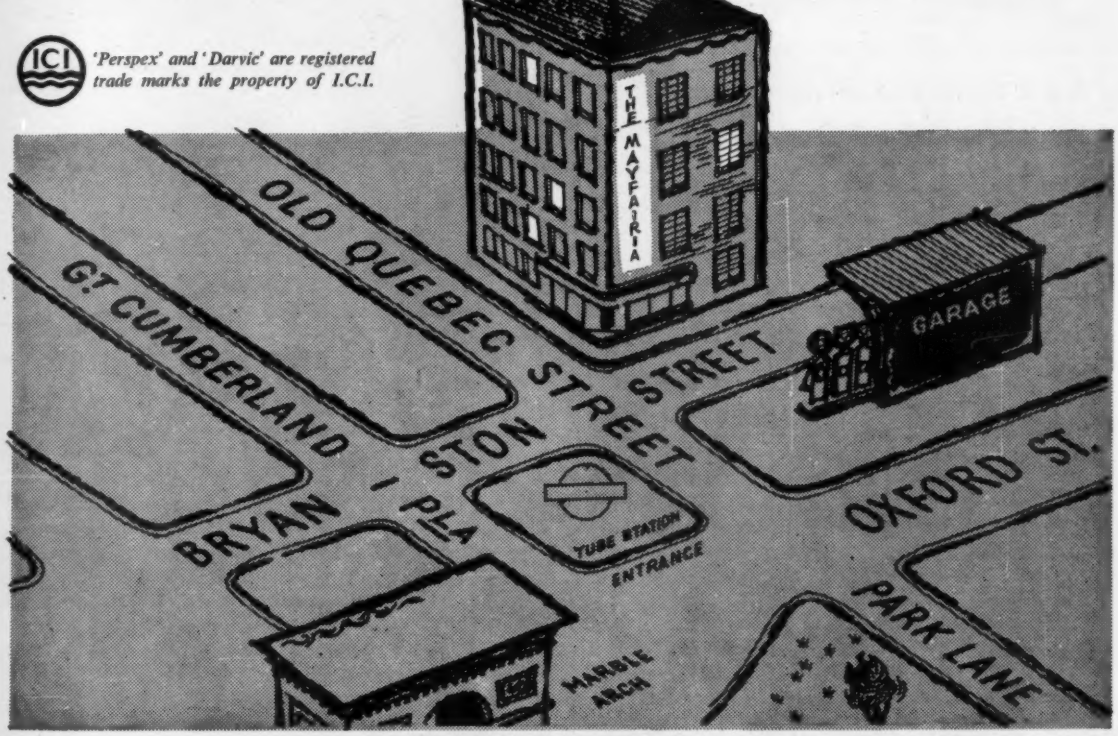

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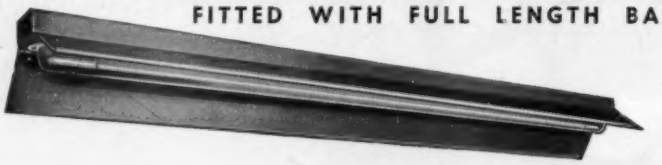

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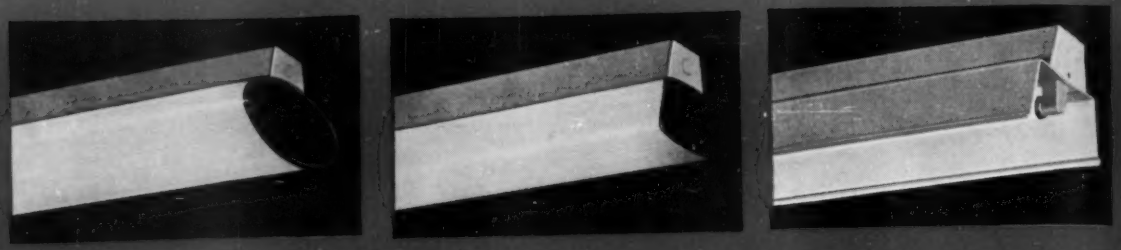

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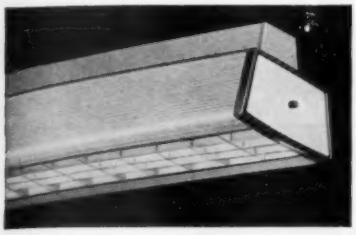

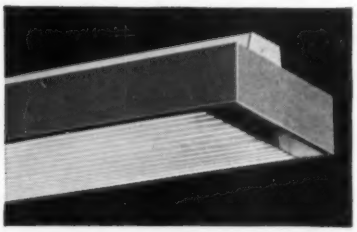

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G.E.C. range 101

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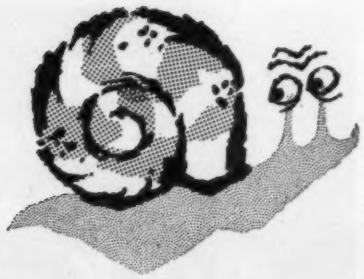

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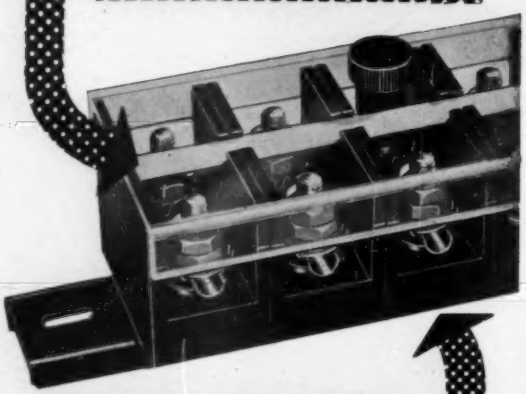

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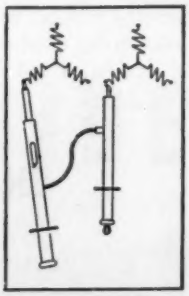

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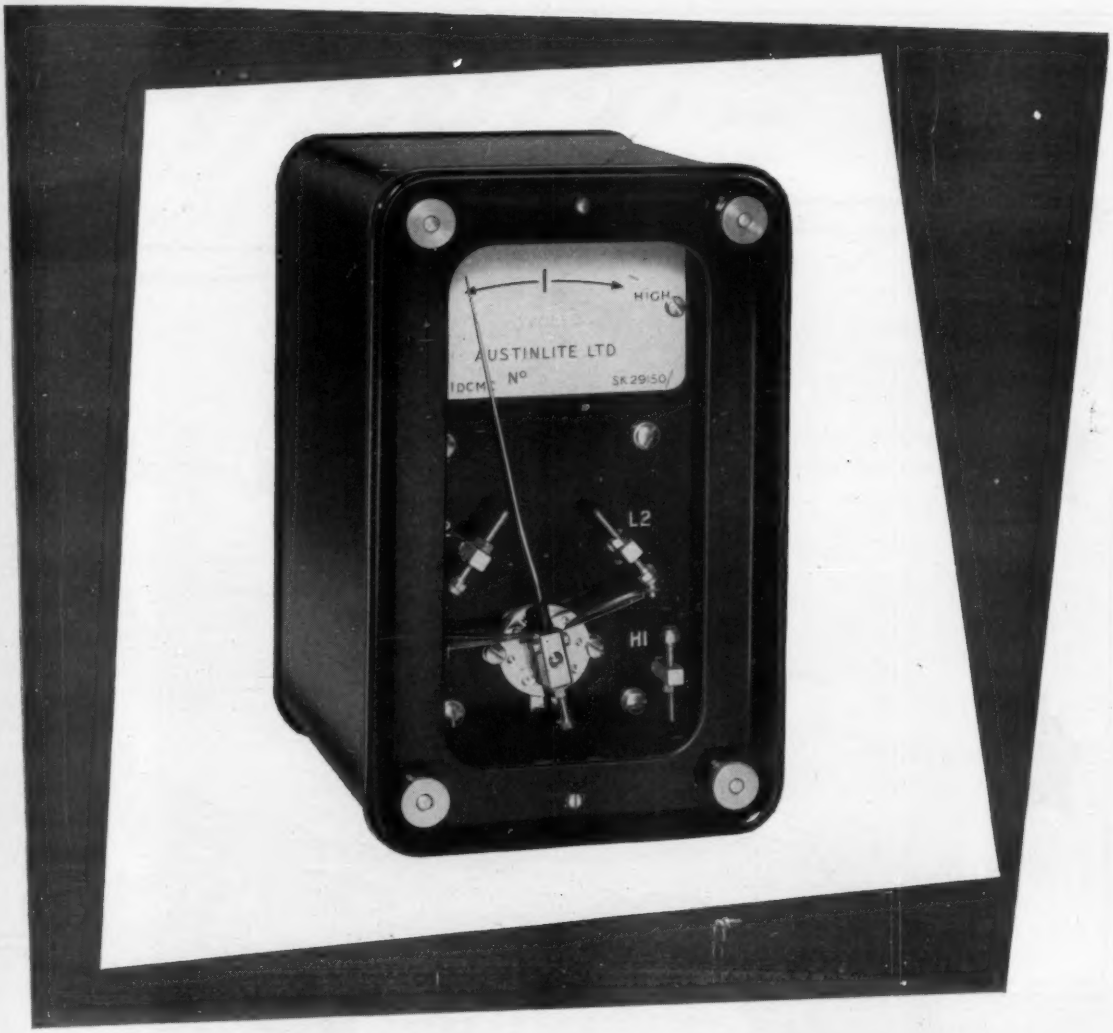

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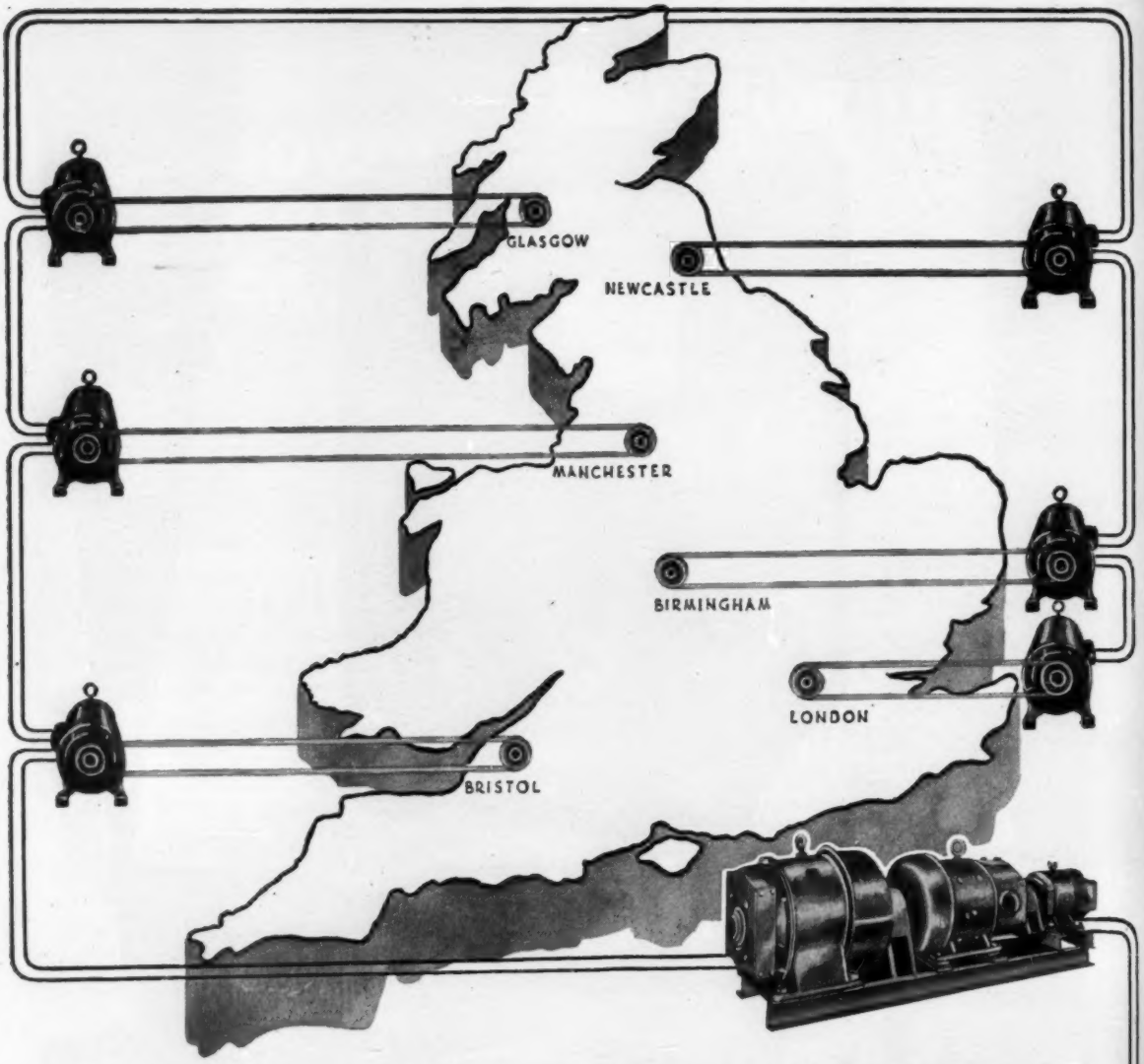

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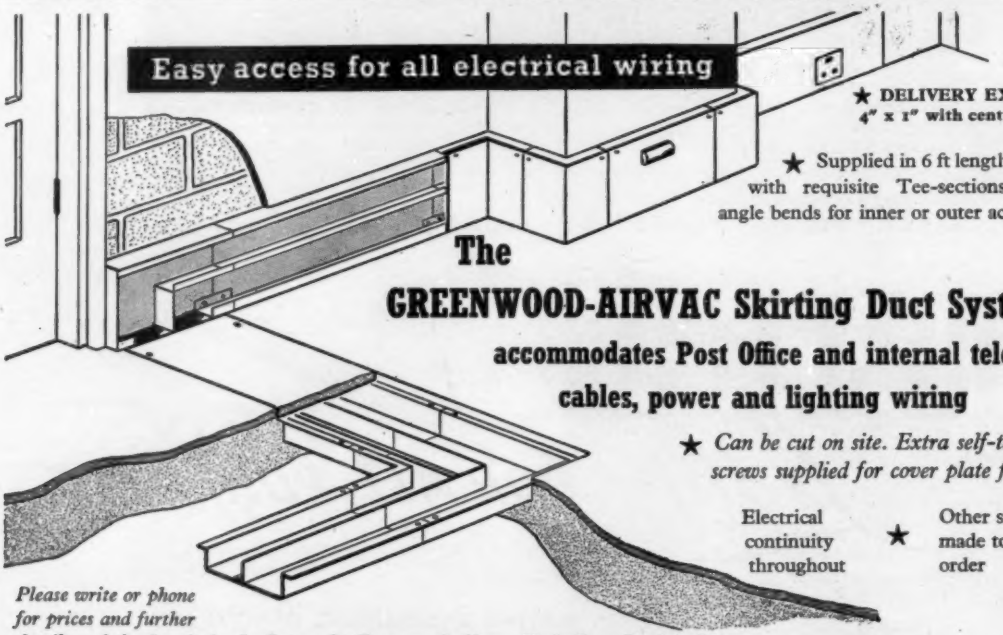

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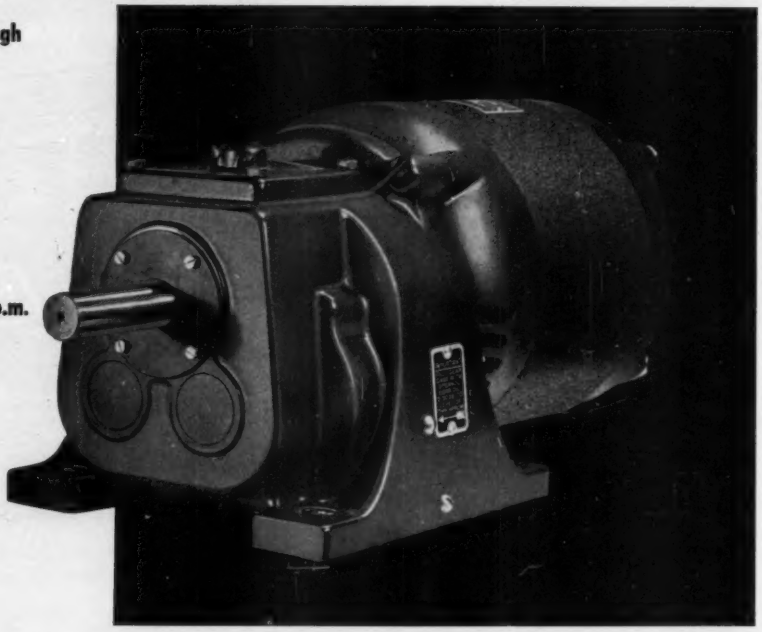

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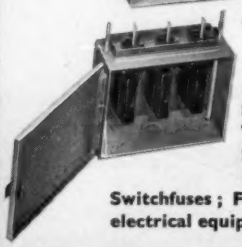

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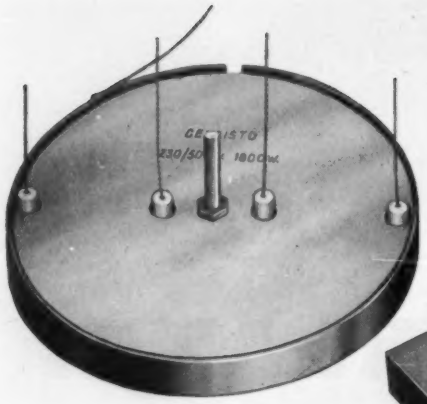

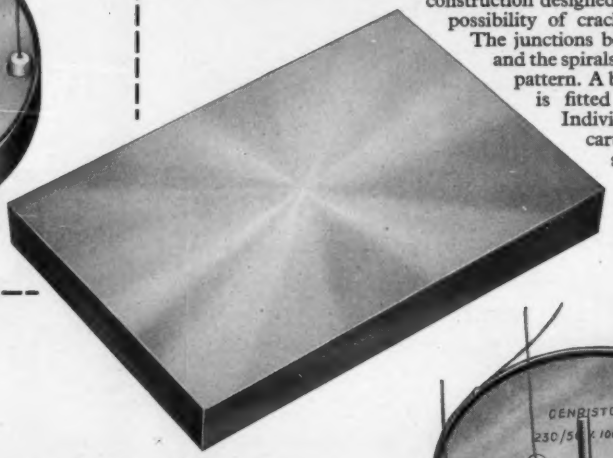

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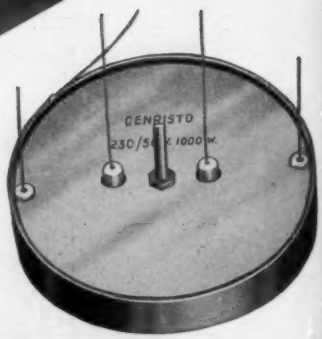

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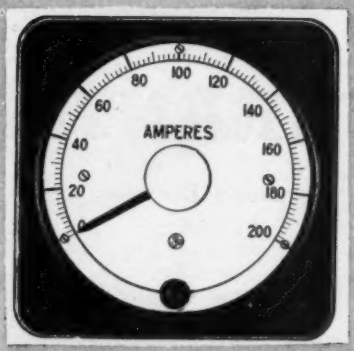

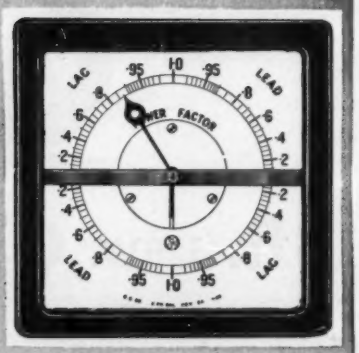

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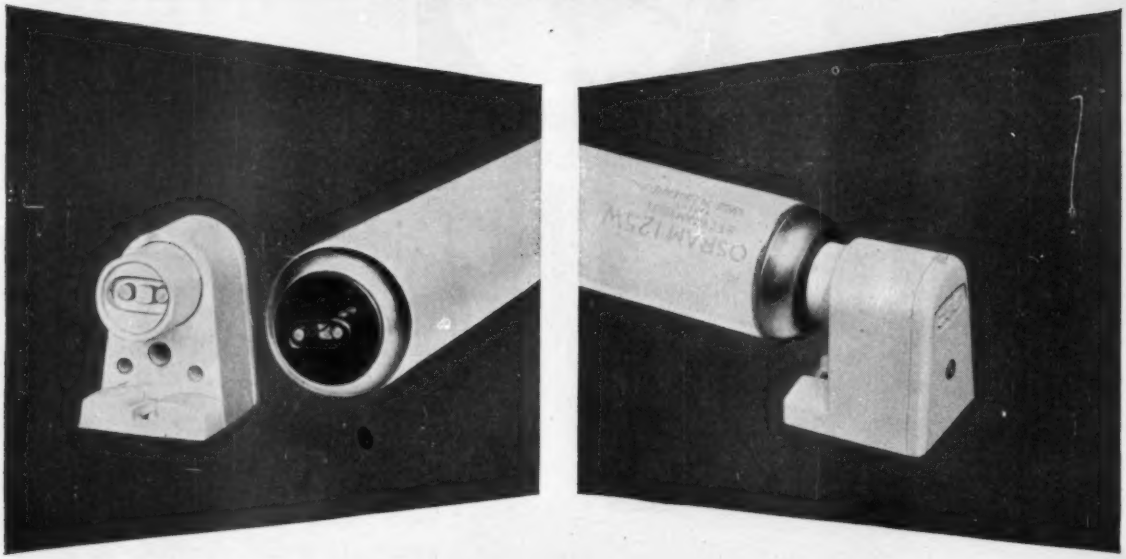

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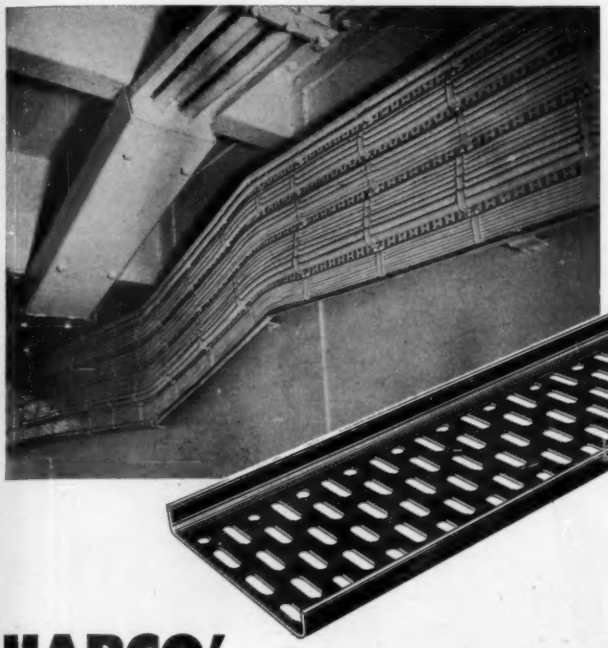

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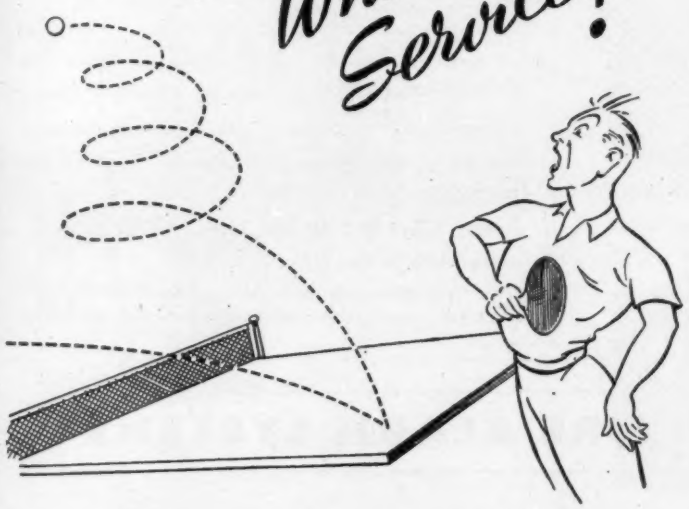

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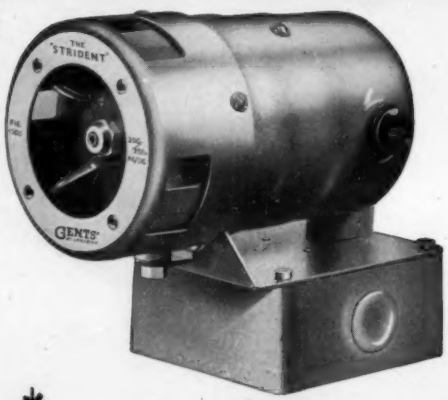

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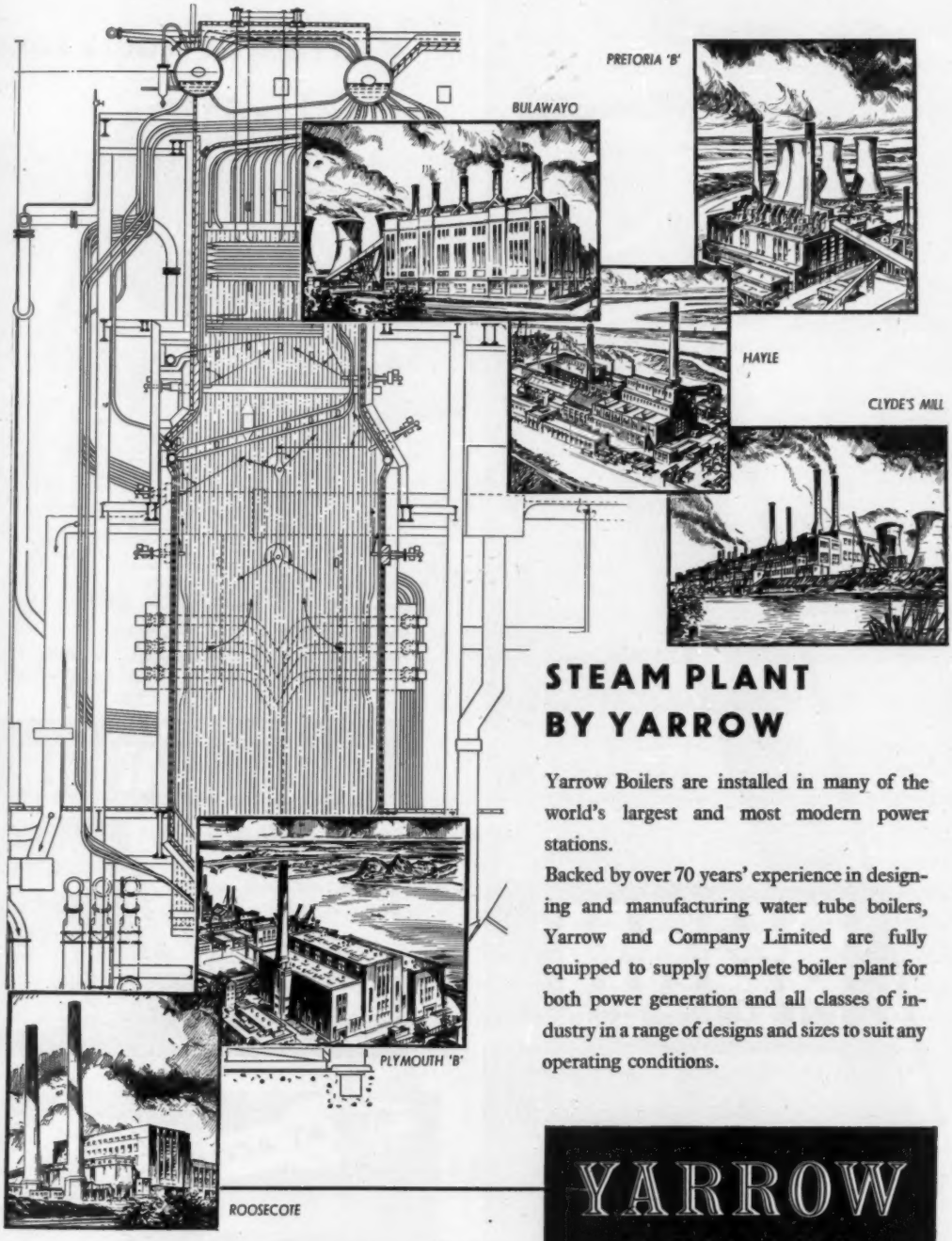

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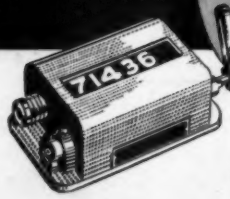
Locates faulty earths in all electrical equipment, portable tools, etc., and avoids accidents. Conforms to official requirements.

Write for leaflet 25.B.

Runbaken MANCHESTER 1.

AIM AT ACCURACY



TRUMETER
FOR MEASURING AND COUNTING
TRUMETER CO. LTD., MILLTOWN STREET, RADCLIFFE, LANCS
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BEFORE YOU CAN SAY NICHROME*

We have strong grounds for claiming our resistance wire-drawing plant at Cheadle the most modern in existence. Yet even with the latest machinery and production methods quite a number of operations are carried out by hand. Which might seem odd with a finished product apparently so simple and straightforward. The reason is that a great part of the secret of making Nichrome*, which is recognised as the world's standard of quality for electrical resistance wire, lies in the special skills used at every stage of the process. They are skills born of experience and the belief that anything less than perfection is not acceptable. We label the material Nichrome* only when we are satisfied that it is completely matched to specification.

NICHROME* V Temperatures up to 1150°C (2102°F) for resistor elements in industrial and domestic appliances

NICHROME* Temperatures up to 950°C (1742°F) for domestic and similar appliances in the medium temperature range

Write for Data Sheet No. 5, a 24-page handbook giving data and specifications for the Nichrome alloys*

BRITISH DRIVER-HARRIS CO LTD

MANCHESTER 15

1908-1958 50 years

GOLDEN JUBILEE 1958

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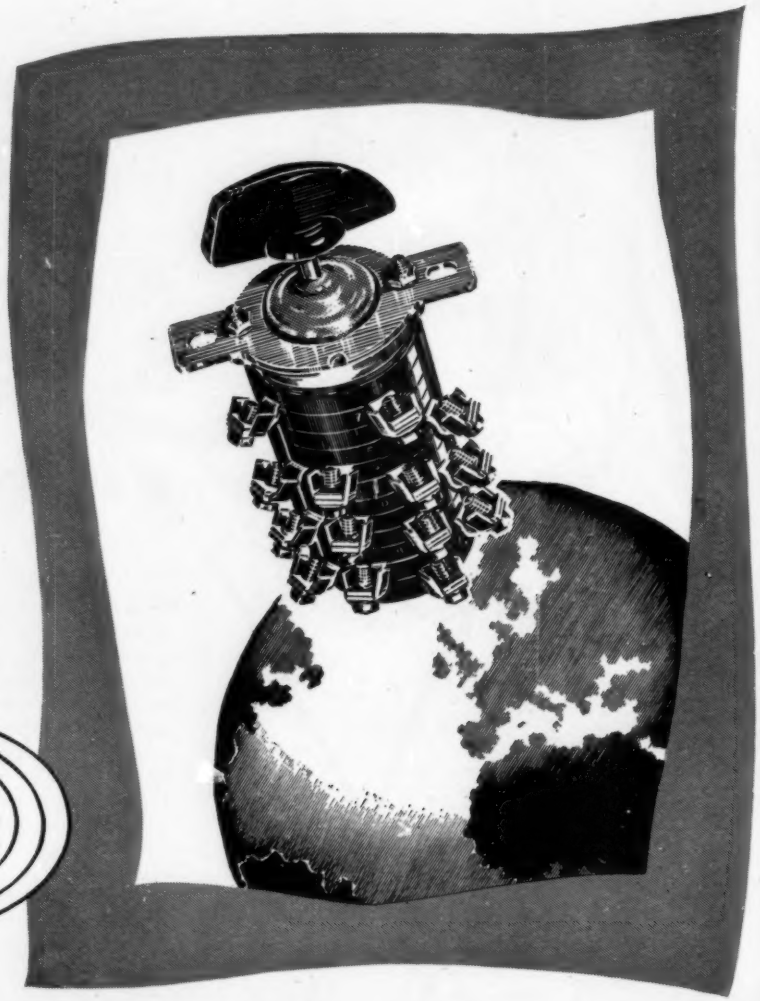
Perfect Control by

SANTON



ROTARY SWITCHES *used all over the world!*

Santon Rotary Switches are the most convenient and reliable for

- sequence starting control for electric motors
- transformer tap changing
- 'charge' and 'discharge' battery switching
- economical remote control applications
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COMPLETE RANGE OF SWITCHES FROM 5 TO 500 AMP. CAPACITY—30 YEARS' EXPERIENCE IN ROTARY SWITCH DESIGN

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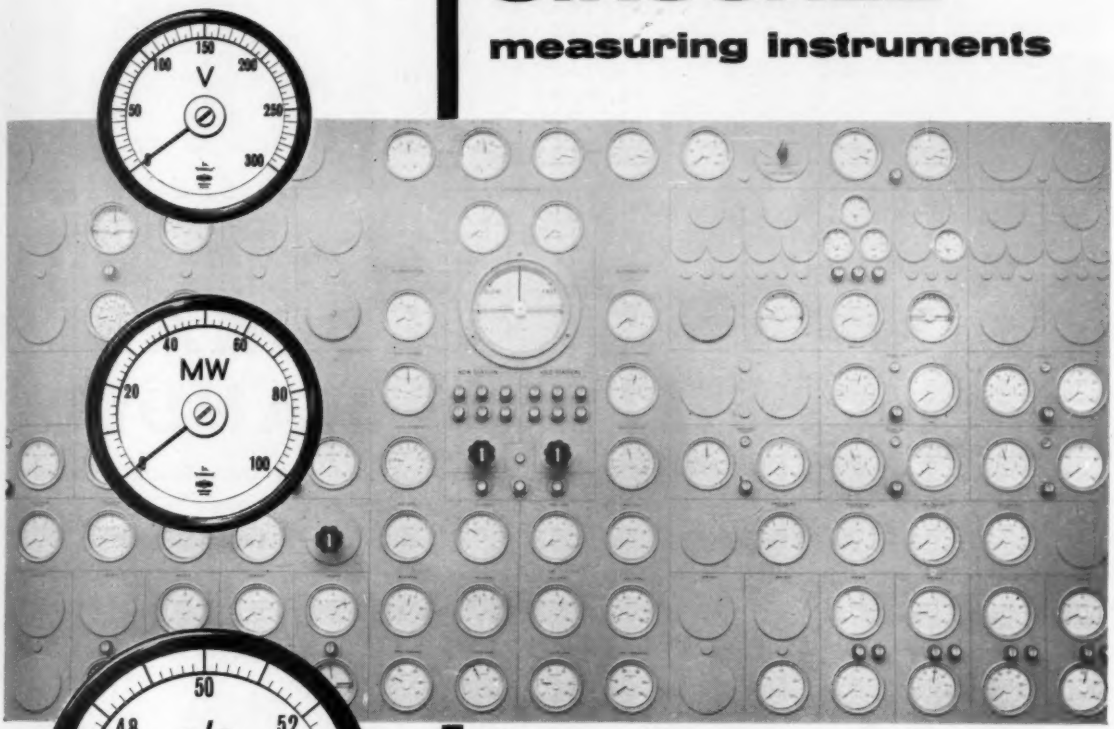
measuring instruments



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Whether your demand is in Megawatts or Kilowatts, an accurate knowledge of your loading and supply conditions is essential. "Cirscale" Indicators are available as :-

Ammeters,
Voltmeters,
Wattmeters,
Varmeters,
Power Factor Indicators,
Frequency Indicators,

in a wide range of sizes in contemporary styling as illustrated.

Widely used by C.E.A. and other Supply Authorities, and by many leading industrial concerns for a good reason – dependability!

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THE RECORD ELECTRICAL CO. LTD

"Cirscale" Works, Broadheath, Altrincham, Cheshire.

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Lockable
HANDLE OPERATED
SWITCHES

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THE SWITCH SPECIALISTS

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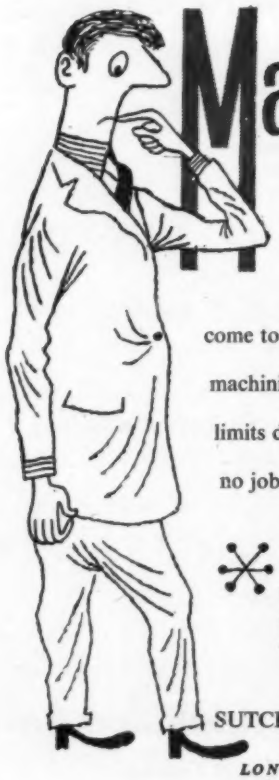
LOCKABLE HANDLE

for fitting to our standard switches up to 12 positions.
Master or sub-master keying.
Key withdrawability where desired.
Matching locks for doors available.

CRATER PRODUCTS LTD • WOKING • SURREY



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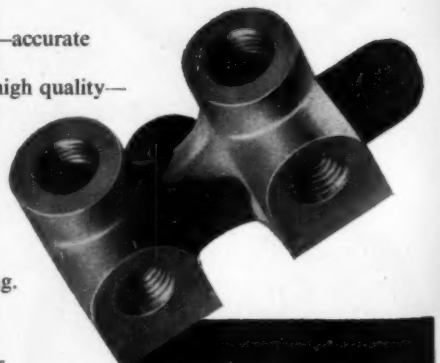
For hot pressings and stampings—accurate well-finished and of consistently high quality—come to Sutcliffe Speakman. We undertake machining where necessary and can work to limits down to .0005". No quantity is too large, no job too complicated, no standard too exacting.



In all non-ferrous alloys including aluminium, brass, chromium copper, cadium copper, manganese bronze and nickel silver. Also castings in gun-metal, phosphor bronze and heat-resisting nickel chrome alloys.

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SUTCLIFFE SPEAKMAN AND CO. LIMITED · *Leigh, Lancashire* · *Telephone: Leigh 94*

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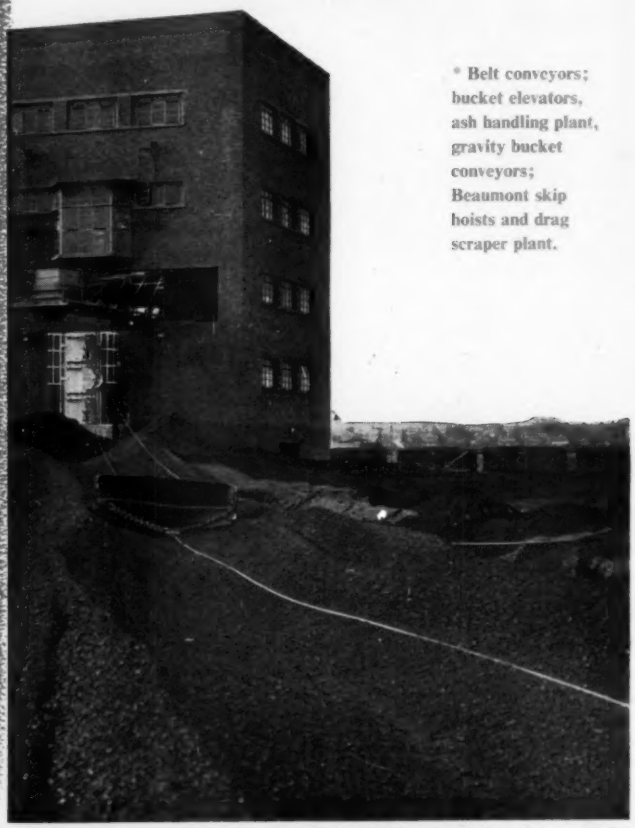
ALL ALONG THE LINE IT'S

The range of IC material handling equipment is sufficiently comprehensive* to handle almost any loose material from its source to ultimate use or disposal. Progressive design and sound IC engineering mean more efficient handling all along the line.

* Belt conveyors; bucket elevators, ash handling plant, gravity bucket conveyors; Beaumont skip hoists and drag scraper plant.



Installation of drag scraper plant at a steelworks.

IC

INTERNATIONAL COMBUSTION PRODUCTS LIMITED

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AIREDALE
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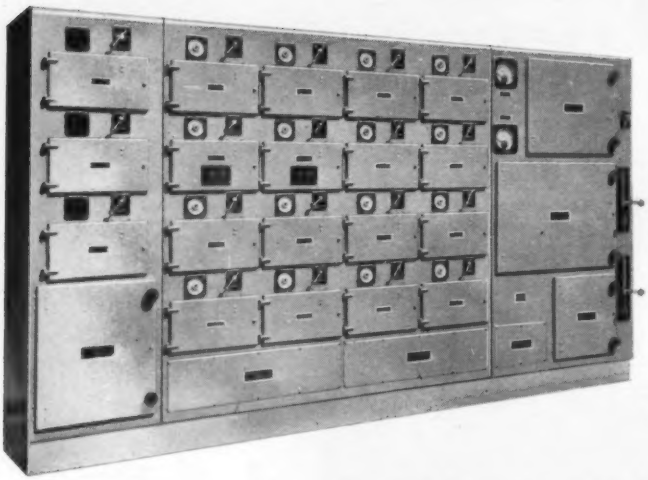
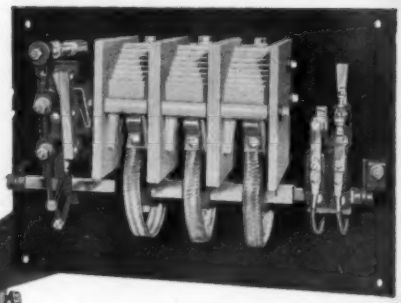
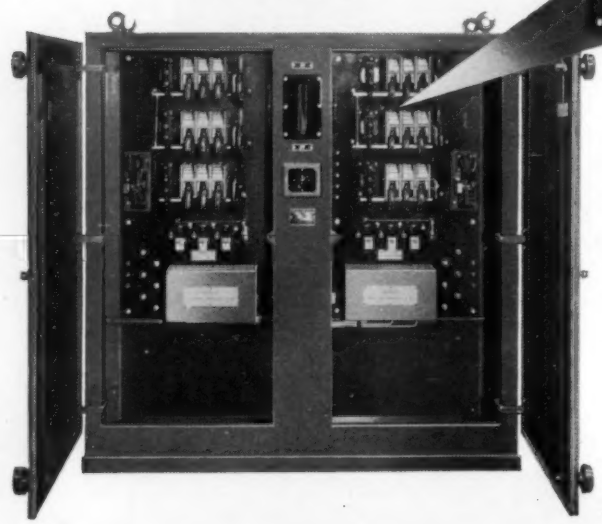
A.C. AIR BREAK CONTROL GEAR
(CSA APPROVAL No. 13738)
CONTACTORS, TIMERS, RELAYS
AUTOMATIC STARTERS
MANUAL STARTERS
L.T. OIL IMMERSED SWITCHGEAR
CIRCUIT BREAKERS
SWITCHBOARDS
CUSTOM BUILT COMPOSITE GEAR



On the left is illustrated a typical Multi-Motor Switchboard with busbar-fed individually isolated starter cubicles



Twin 35 h.p. Star-Delta Cubicle with Central Isolator

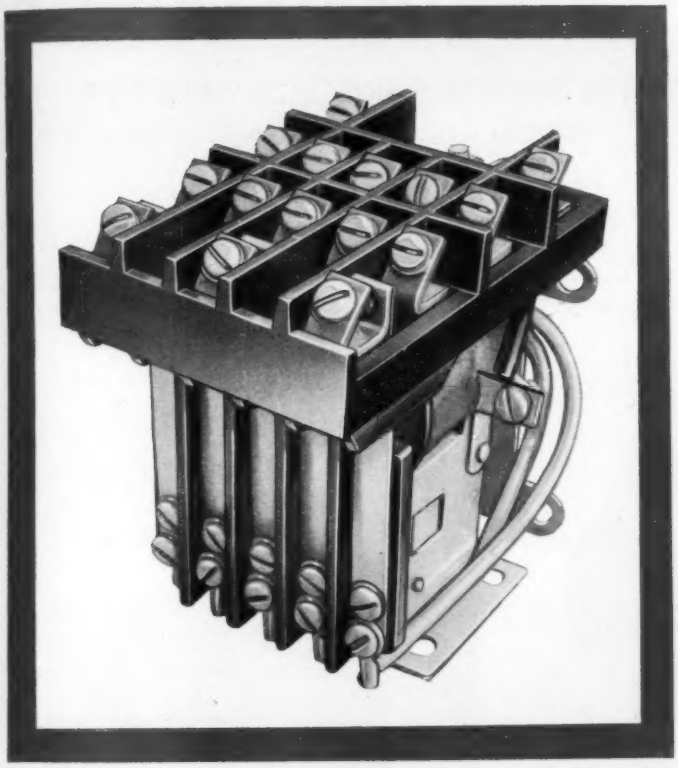


A.C. AIR BREAK CONTROL GEAR

Contactors to BSS. 775 : 1956 Type-tested by an Asta Proving Station are fitted throughout the range of Standard Automatic Motor Starter Specifications and Custom Built Composite Control Gear by . . . AIREDALE

AUTOMATIC MOTOR CONTROL GEAR

This is really quite a relay . . . .



Suitable for frequent duty, this general purpose relay has passed a life test of 5 million operations at a rate of 150 operations per minute.

5 blades and up to 5 normally open and 3 normally closed contacts can be fitted, allowing 36 standard contact combinations. D.C. or A.C. versions are available. The contact rating on A.C. is 5 amps on a normally open contact and 2 amps on a normally closed contact. On D.C. the normally open contacts are rated at 200 watts and the normally closed at 50 watts. Dimensions are 2⅛″ wide, 3½″ high, 3¼″ deep.

You might call this one of our standard items—and very good it is too. But at E. N. Bray we tend to go in for the out of the ordinary jobs and whilst we shall be delighted to supply you with relays, contactors, starters, and so on from stock or at a reasonable delivery, we shall be no less happy to design and build equipment to meet your own special needs.

Now available Ex Stock

TYPE 8Z 151-5

For A.C. operation and having
5 - Blades,
5 - Normally open contacts,
1 - Normally closed contact.

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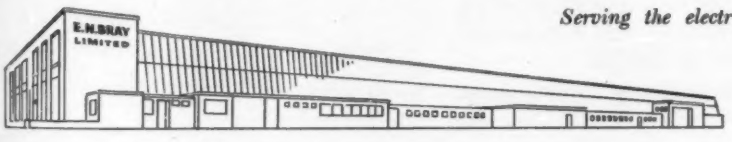
Control Gear Works, Britannia Road, Waltham Cross, Herts. Telephone: Waltham Cross 2212/3/4/5

Serving the electrical industry for more than 30 years



V-dr

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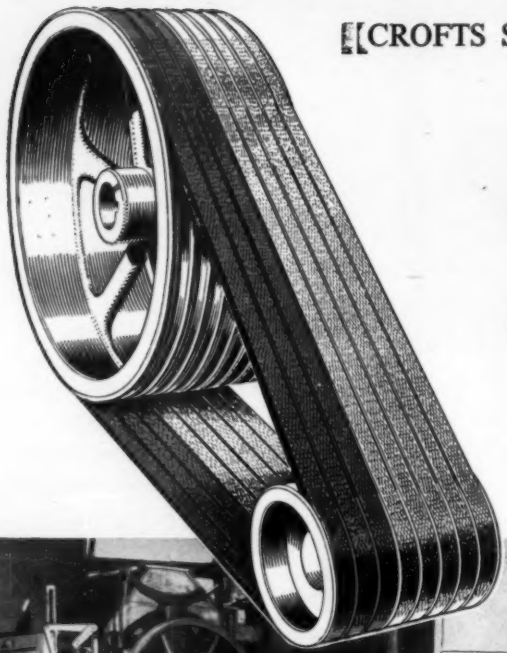
CROFTS SUPROR SURE-GRIP V-ROPE DRIVES

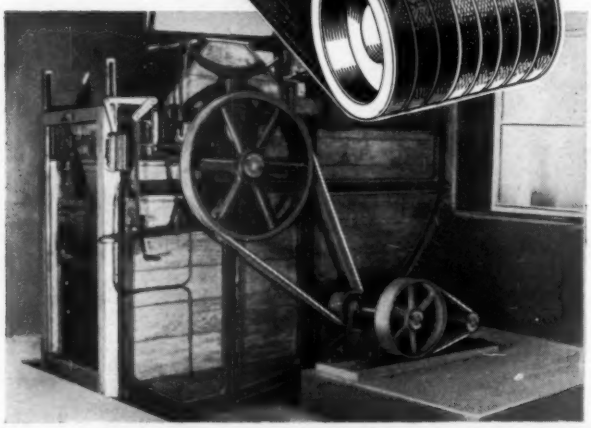
Standard drives up to 950 h.p. Ratios up to 8 : 1.

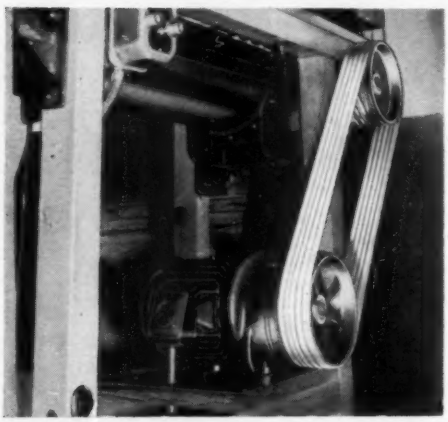
Publication 156



- premium grade ropes give 25 to 75% more power, yet retain long-life durability
- pulleys supplied with either parallel-bored and keywayed or fitted with quick-change Crofts Patent Taper-Flushbush

drives up to 130 hp from stock





These applications are typical examples of the adaptability of Taper-Flushbush V-rope Pulley drives

CROFTS (ENGINEERS) LIMITED

POWER TRANSMISSION ENGINEERS

Head Office : Thornbury Bradford 3 Yorkshire

Telephone: 65251 (20 lines) Telegrams: "Crofters Bradford Telex" Telex 51186

Branches at:

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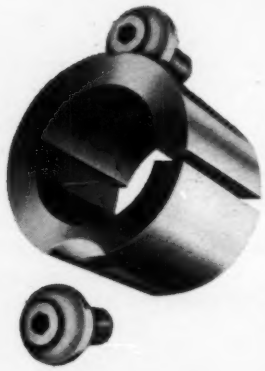
THE FINEST YOU CAN BUY!

CROFTS PATENT TAPER-FLUSHBUSH

⅜" to 4½" bore from stock

Publication DM15



- Easy to fit or remove
- interchangeable bushes to fit a wide range of shafts
- many sizes of Crofts pulleys, chain sprockets and flexible couplings are fitted with the Patent-Flushbush. You can buy the bush to fit to your products or we can supply it in a hub ready to weld on to your conveyor drives etc.

Powergrip "geared belt" Drives

Fractional to 300 h.p.; position positive drive: speeds from inches per minute to 16,000 f.p.m. without slip

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Sprockets with Taper-Flushbush or parallel bore, single, duplex and triplex drive to 120 h.p.

Send us your enquiries

Makers of:

Clutches, Conveyor drives, Couplings of all types, Double helical gear units, Fabricated steelworks, Geared motors, Hydraulic couplings, Iron, steel and non-ferrous castings, Machine-cut gears of all types, Motorised rollers, Patent taper-flushbushes. Plummer blocks, Shaft-mounted gear units, Special machinery drives, Spiral bevel gear units, Turbine gears, V-rope Drives, Variable speed drives, Worm reduction gears

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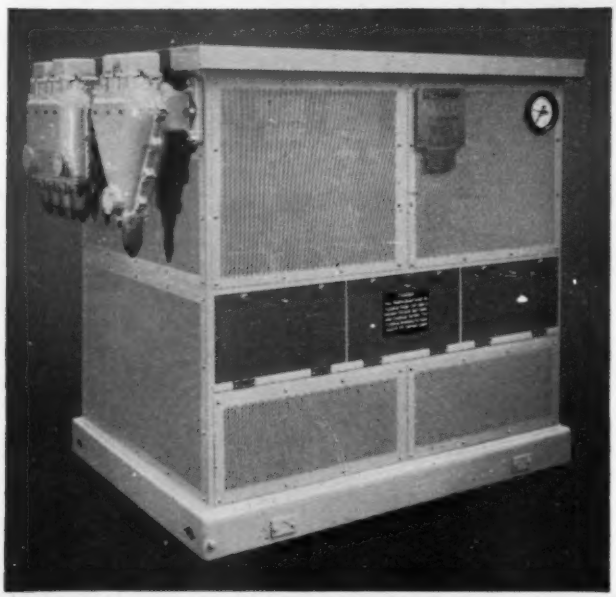
The benefits of silicone-insulated dry-type transformers are becoming better and better known:

* **No fire or explosion risk**
* **Reduced maintenance**
* **Frequent overloading permissible**
* **Smaller size and weight than O.N. or Class B units**
* **Dust, humidity and ventilation are no problem**
* **Can be placed at load centre, therefore making shorter low-voltage cable runs possible.**

The photograph below shows a 500kVA Ferranti dry-type, air-cooled distribution transformer with Class 'C' silicone insulation — B.S.2757 : 1956.



MS

Silicone insulated dry-type transformers ARE SAFER!

Here is a list of well-known British manufacturers already producing silicone-insulated dry-type transformers for the United Kingdom and overseas. These transformers have already been installed in:

Steel mills · Car factories
Newspaper plants · Food factories
Flour mills · Coal mines
Underground sub-stations
Office buildings · Blocks of flats
Departmental stores
Radar and airfield sites

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Midland Silicones Limited manufacture in Great Britain the full range of silicone resins and elastomers used by transformer manufacturers in the construction of silicone-insulated dry-type units.

MIDLAND SILICONES LTD

(Associated with Albright & Wilson Ltd. and Dow Corning Corporation)

first *in British Silicones*

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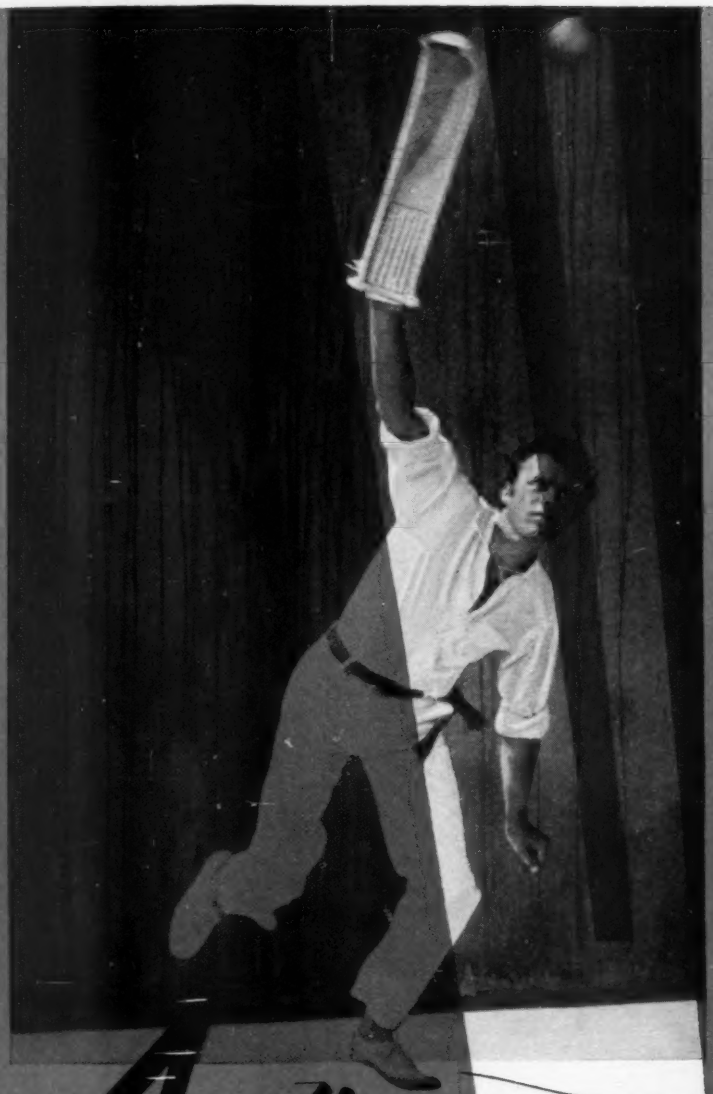

Dirk Bogarde—Rank Organisation star—is currently appearing in "Campbell's Kingdom"

Swift's the word

for the speed and snap judgment demanded by **pelota** *—the Spanish sport reputed to be the world's fastest and most dangerous ball game. Here, Dirk Bogarde makes a brilliant pelota serve in a film sequence packed with fast-moving action of the kind Henley give their customers. If you want wiring cables . . . and you want* **action** *. . . you want Henley's!*

IF IT'S *Action* YOU'RE AFTER,

CALL HENLEY

A Nation-wide network of 28 Henley Branches brings you the cables you want . . . where you want them . . . when you want them.

HENLEY WIRING CABLES FROM STOCK

- V.R. Taped and Braided
- P.V.C. Insulated only
- P.V.C. Insulated and Sheathed
- Polythene Insulated and P.V.C. Sheathed
- V.R. Insulated Tough Rubber Sheathed
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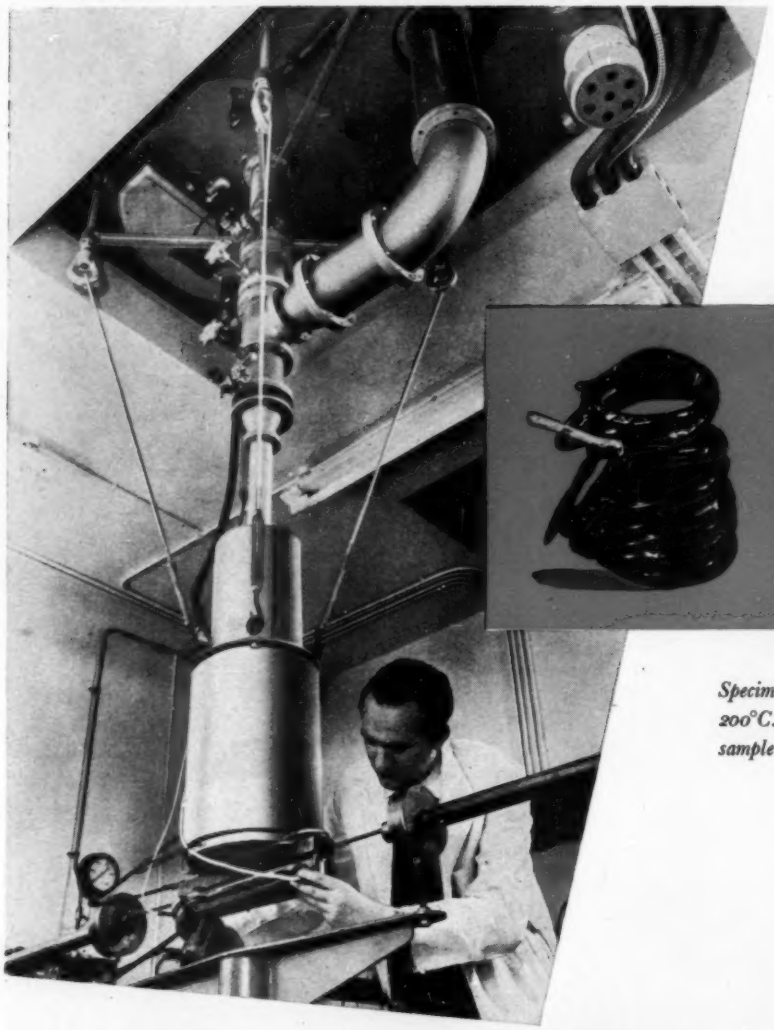
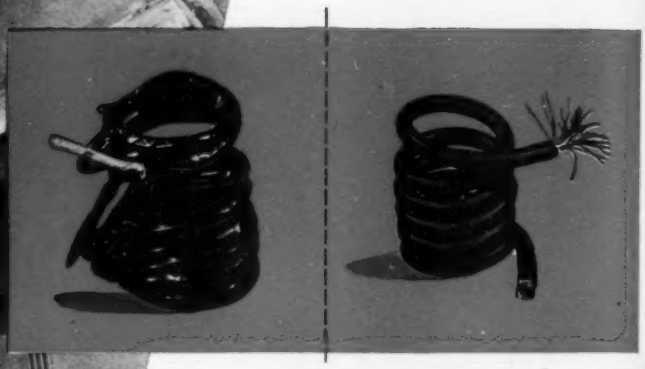
- Flexible Cords—Rubber and Plastic

These are but a few of the very wide range of cables and wires we manufacture to cover every electrical need.

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD · 51-53 HATTON GARDEN · LONDON · EC1 · Telephone: CHAncery 6822



Setting up polythene core ready for irradiation.



Specimens of polythene cable after heating at 200°C. Left: Normal sample. Right: Irradiated sample.

How we make good cables—better

Take polythene for instance, already noted for its excellent electrical characteristics and widely used in the cable industry.

Then make it stronger, more elastic and improve its temperature characteristics. The result, a better material still.

How do we do it? By bombarding polythene with electrons to cause a chemical change. A process known as electron irradiation and an important step forward in the general development of plastic materials for our wide range of cables.

We have a publication which tells you more about this process. May we send you a copy?

BICC IRRADIATION OF POLYTHENE

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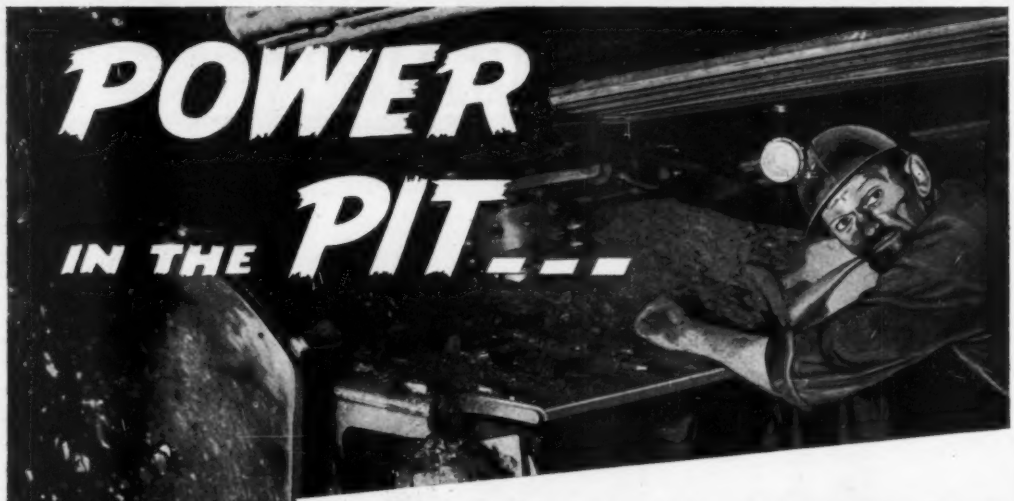


POWER IN THE PIT...

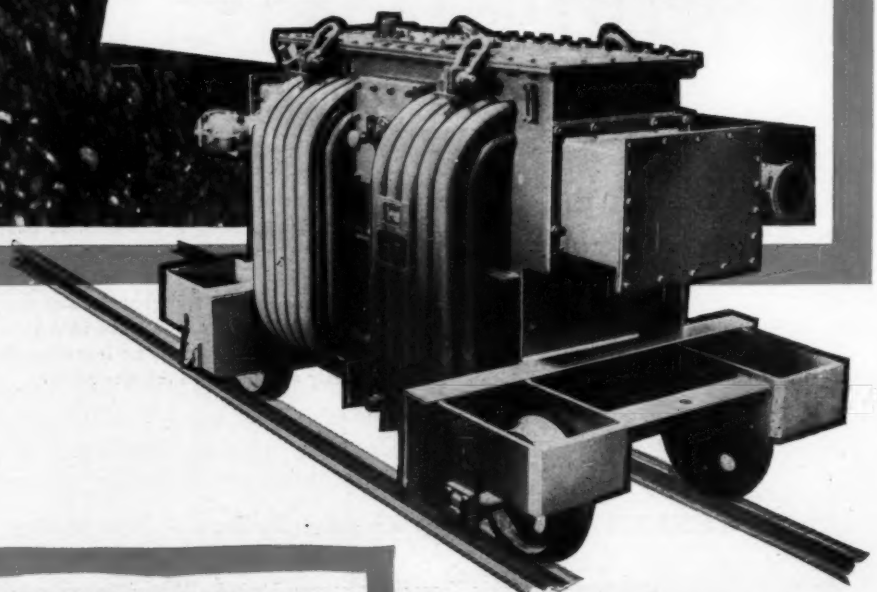
to National Coal Board Specifications

Brentford supplies the Standard Type "S" Underground Mining Transformer in a range of 100 to 300 kVA, 3 phase, with a ratio of 3300/565 volts. These comply fully with NCB Specification P.109/1954.

We also supply the Universal Range complying with NCB Specification P.108/1954 which offer 3 primary voltages under types A, B or C.

MOBILITY. Both Standard and Universal types of Mining Transformers are provided with adjustable rail gauges and with alternative clearances to ground of 1" or 5". A pivot type under-base can be supplied if required.

SWITCHGEAR
Standard NCB Flanges are incorporated suitable for fitting of switchgear if required.



BRENTFORD MINING TRANSFORMERS

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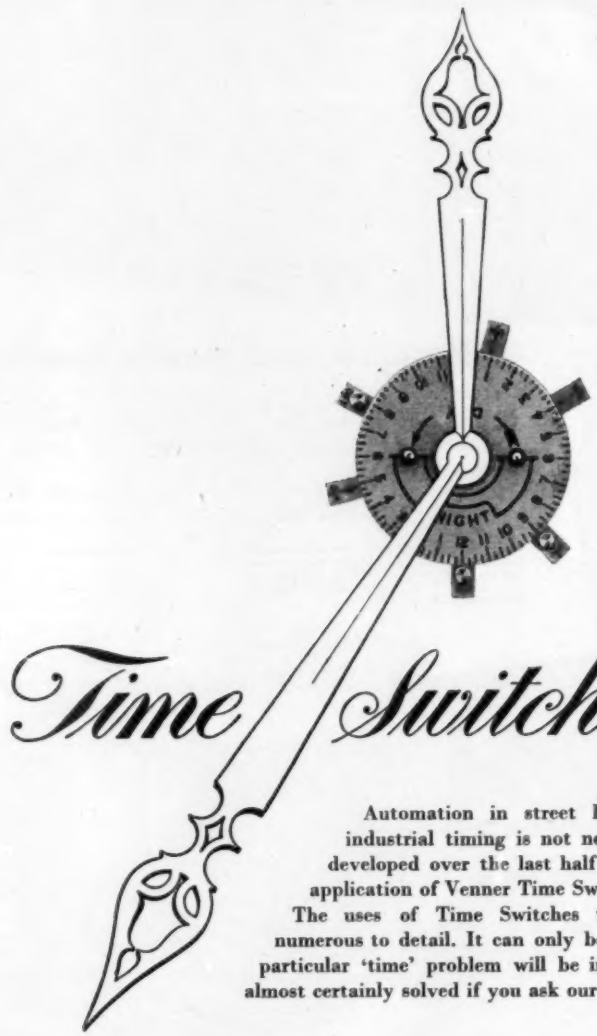

Time Switches

Automation in street lighting and in industrial timing is not new. It has been developed over the last half century by the application of Venner Time Switches.

The uses of Time Switches to-day are too numerous to detail. It can only be said that *your* particular 'time' problem will be investigated and almost certainly solved if you ask our advice.

Time is our business

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Associated Companies: Venner Accumulators Limited · Venner Electronics Limited

The largest overseas transformer contract to be placed in the United Kingdom

F FERRANTI

330,000 volts

transformers for Kariba

The contract awarded to Ferranti Ltd. by the Federal Power Board for the great Kariba Hydro-Electric Scheme on the Zambesi River covers two 120,000 kVA 330/234 kV 3-phase auto transformers with separate boosters; eight 60,000 kVA 330/88 kV 3-phase double-wound transformers; and two 60,000 kVA 330/33 kV 3-phase double-wound transformers. All the transformers will be provided with on-load tap changing gear. The Kariba contract is the largest overseas transformer contract to be placed with a British manufacturer, and emphasises the world-wide confidence in Ferranti Ltd. as builders of fine transformers.

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INSTANT-START
BALLASTS

DESIGNED
TO ENSURE
FULL LAMP LIFE
HIGH LUMEN OUTPUT
SILENT OPERATION

FITTED WITH HIGH TEMPERATURE RESISTING CAPACITORS
AND
GUARANTEED FOR 3 YEARS

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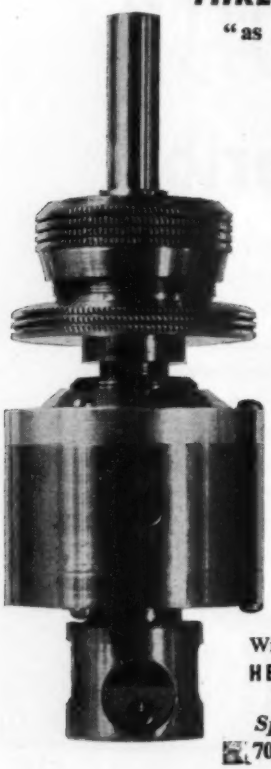
THREADS . . .
"as perfect as the tap used"



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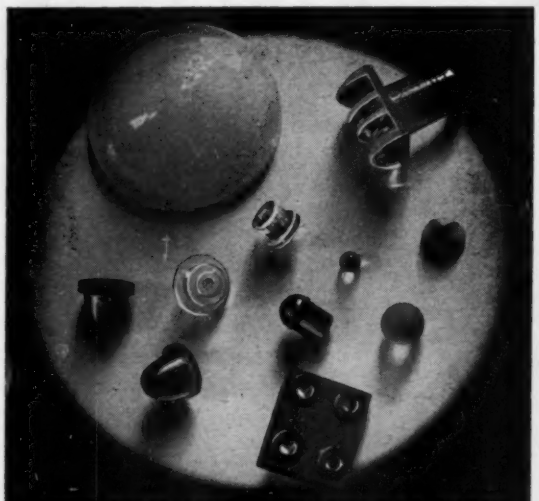

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• PRECISION GLASS MOULDINGS • SEALING BEADS
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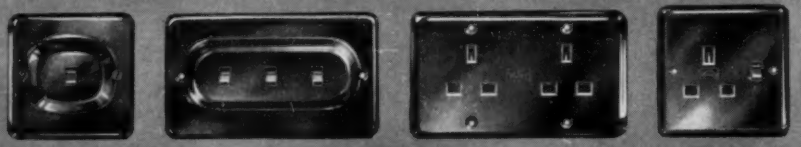

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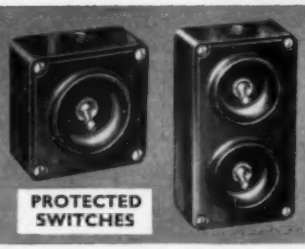
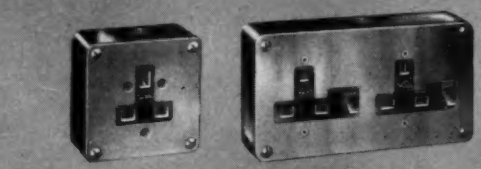


PROTECTED SWITCHES



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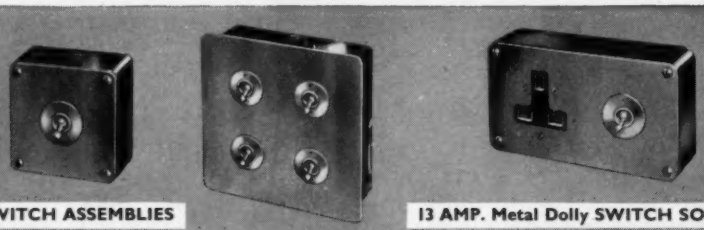

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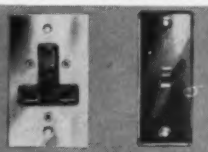

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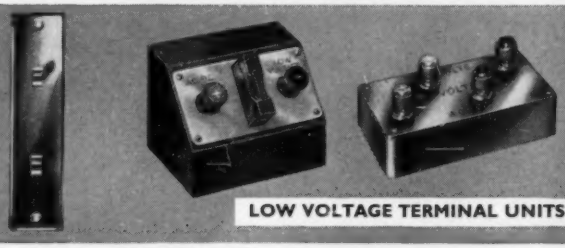

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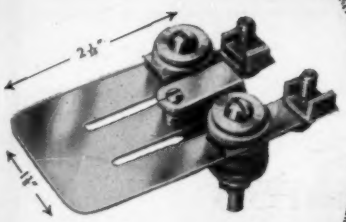

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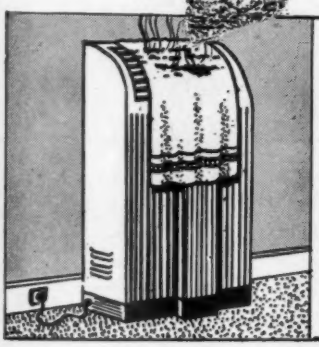

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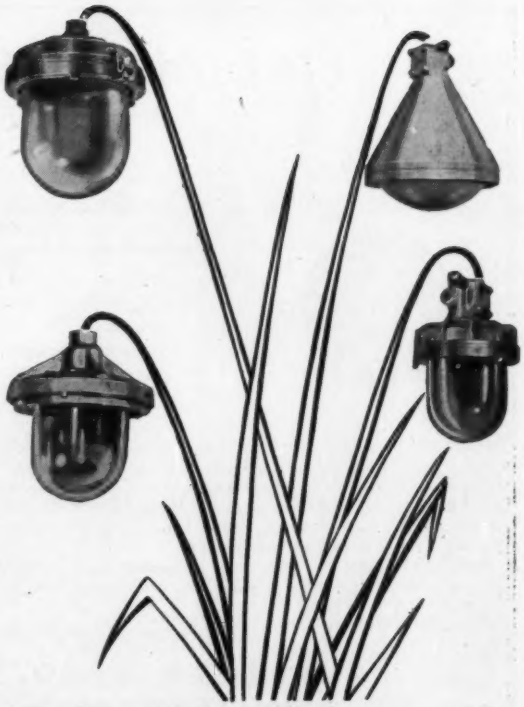

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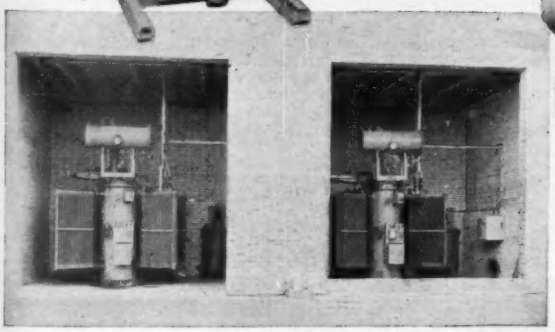

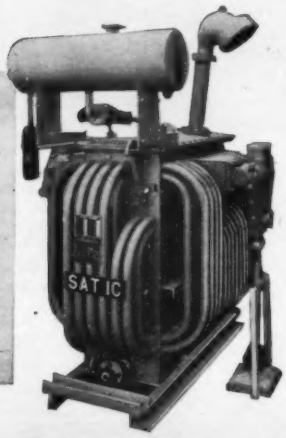

The examples illustrated are (top right and bottom left) 5,000 kVA, 11,000/3,450 volts; (upper left) 1,000 kVA, 3,300/433 volts; and (bottom right) 400 kVA, 3,300/433 volts.

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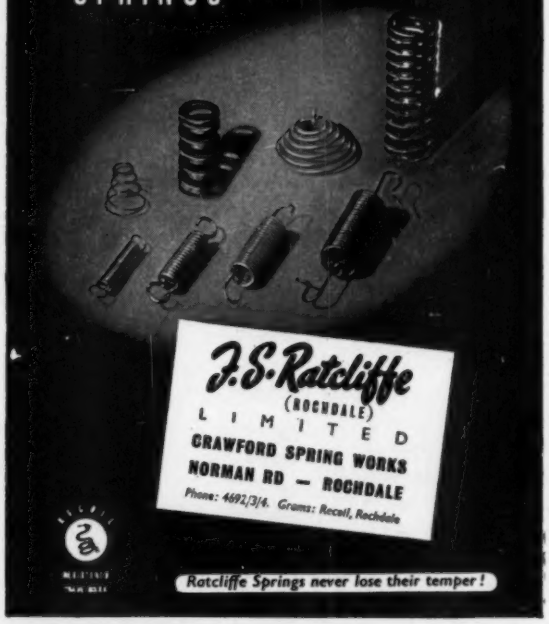

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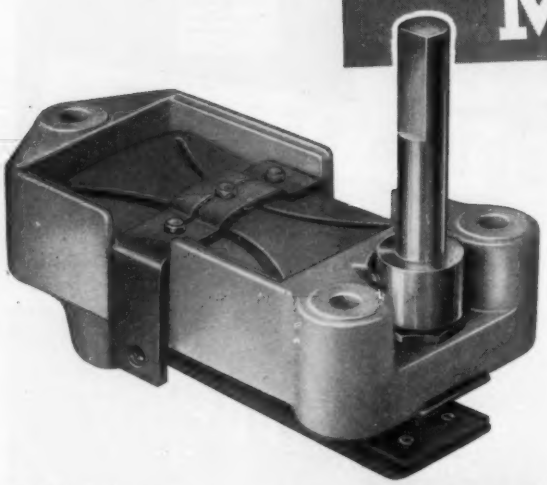

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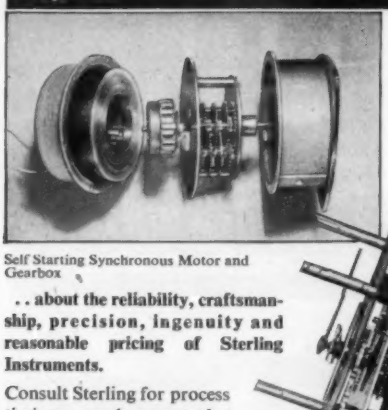

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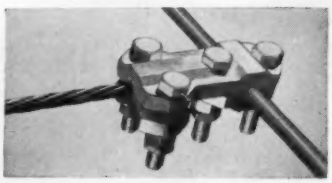

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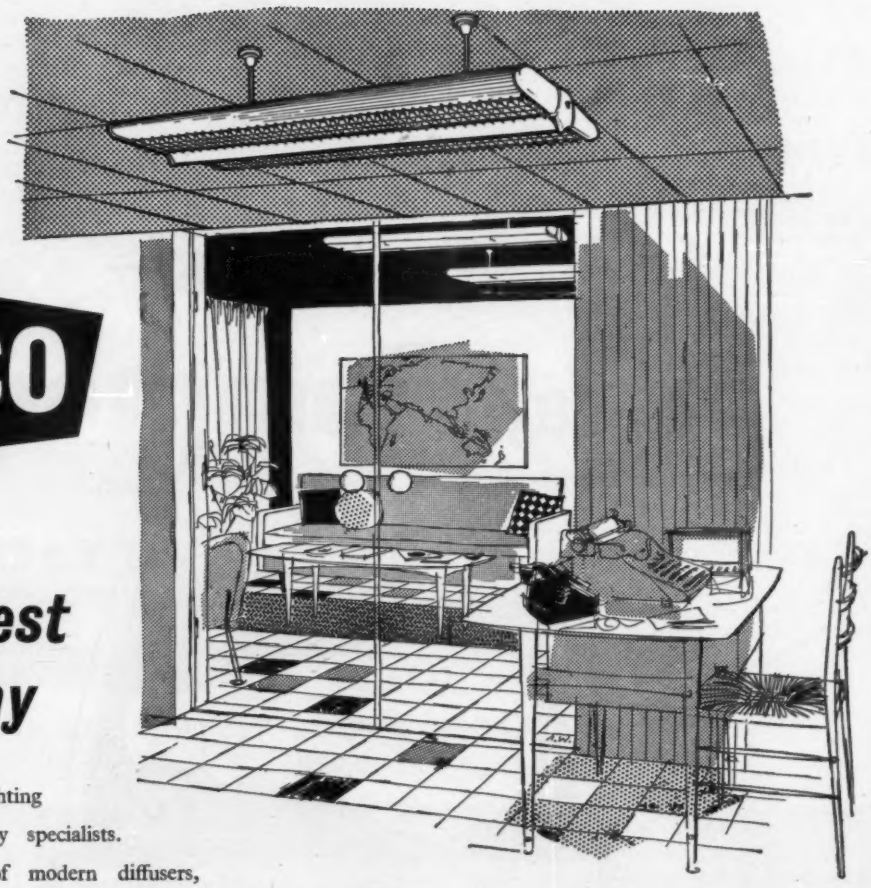

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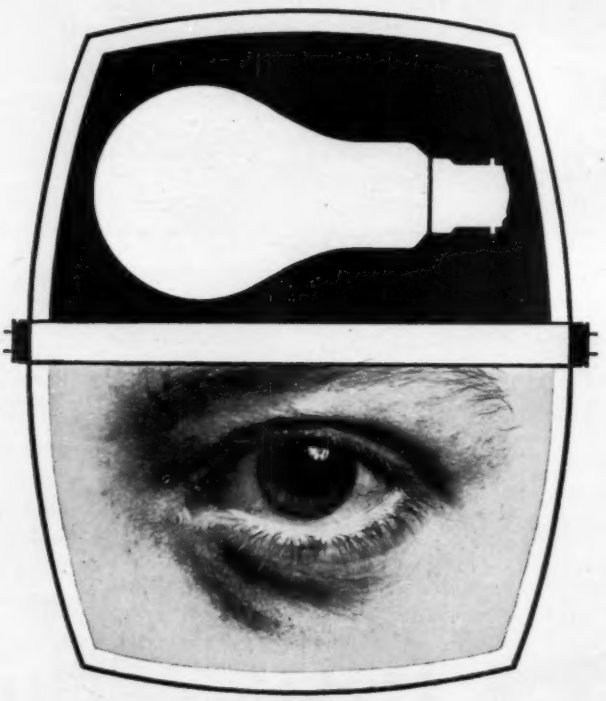

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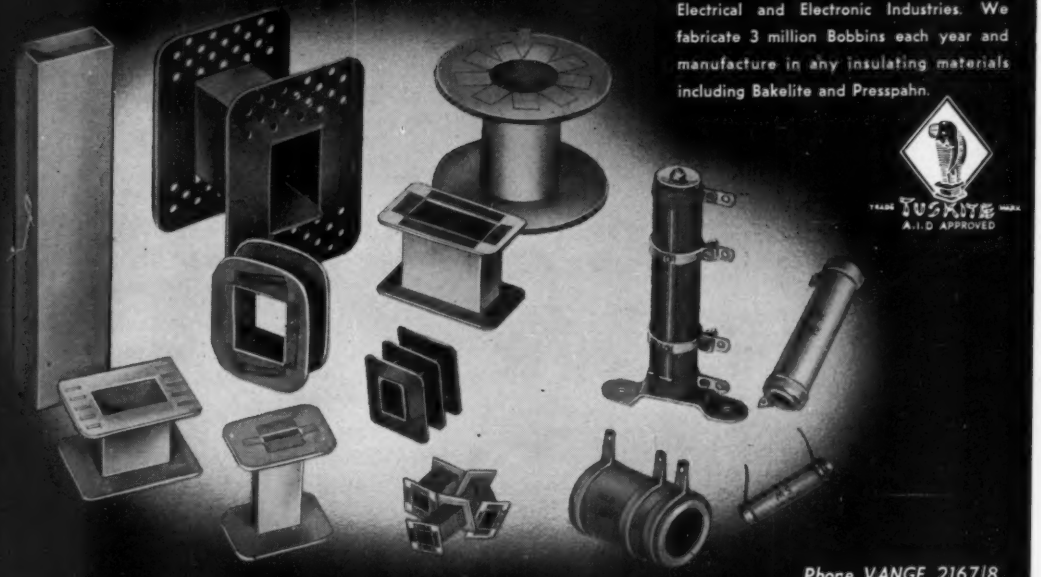

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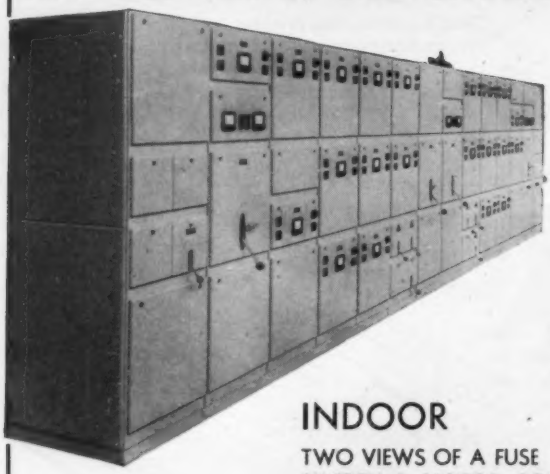

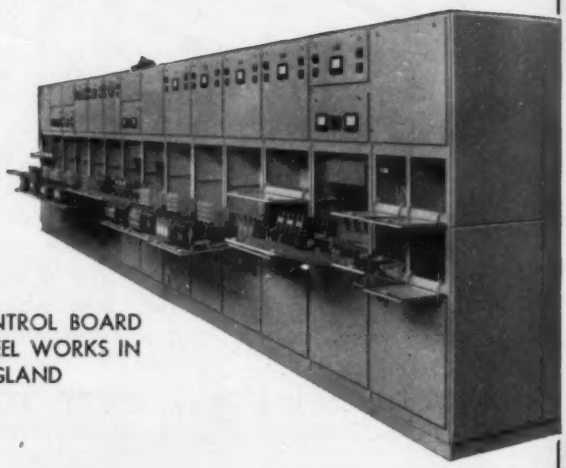

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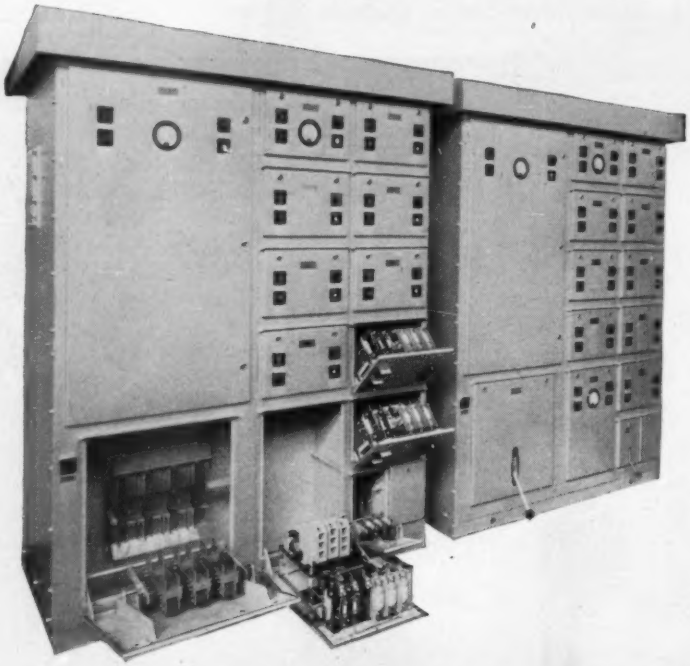

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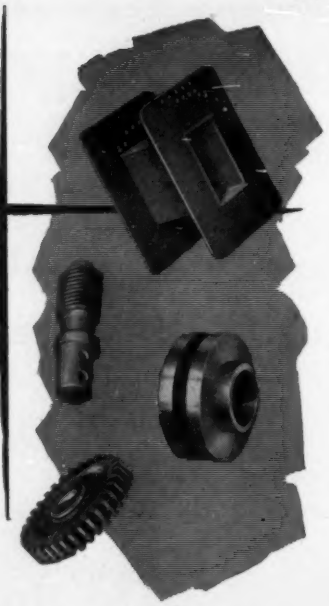

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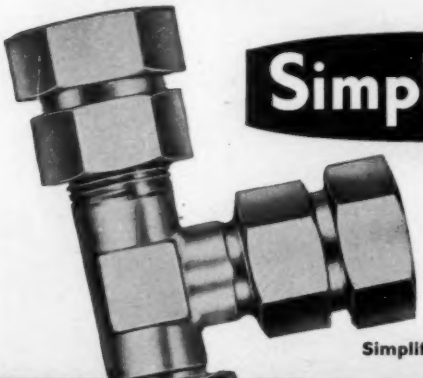

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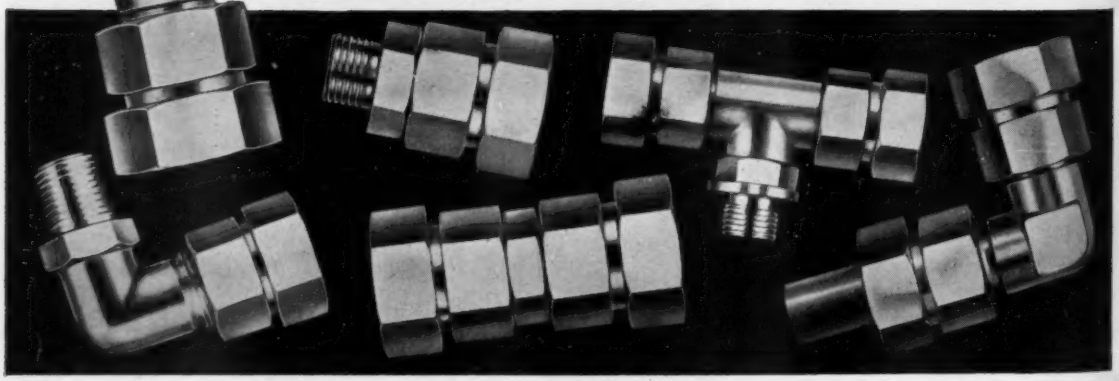

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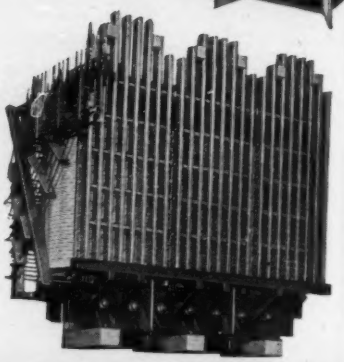

The photographs on the right show, *top*, one of the banks of Hewittic rectifiers depicted above and, *bottom*, a view from the secondary side of one of the main transformers for this installation.

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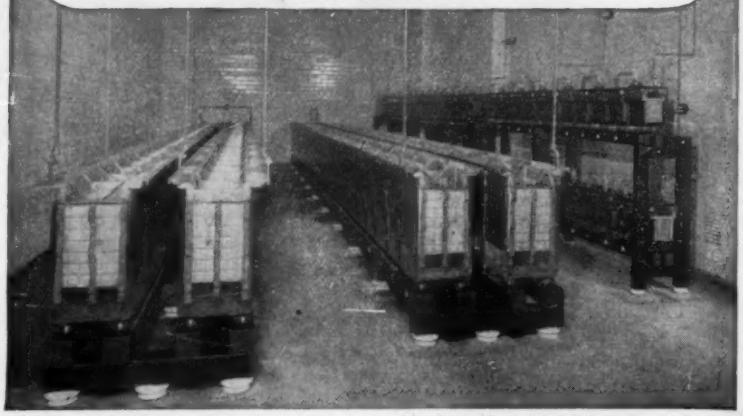

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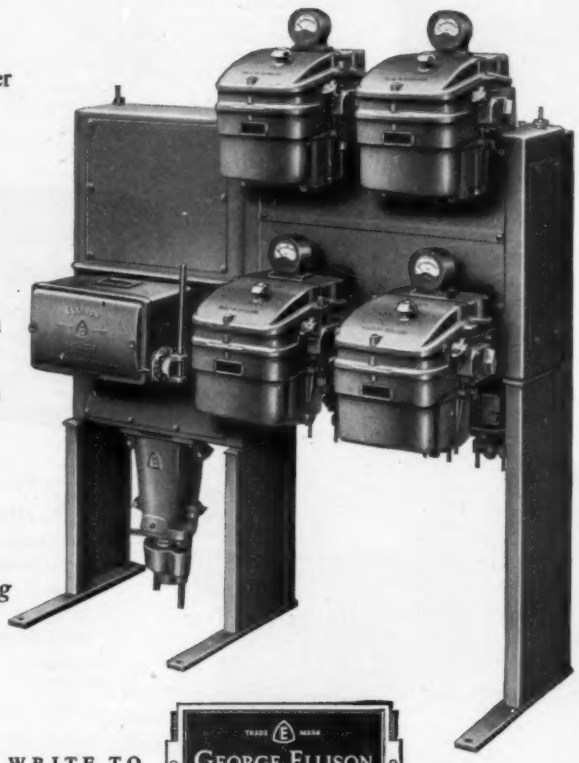

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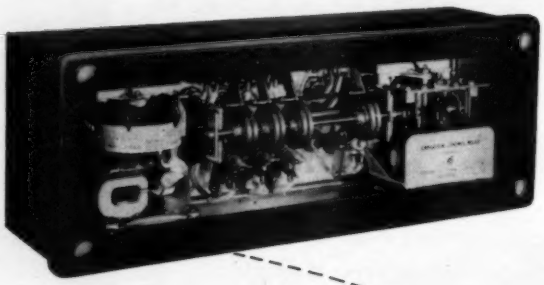

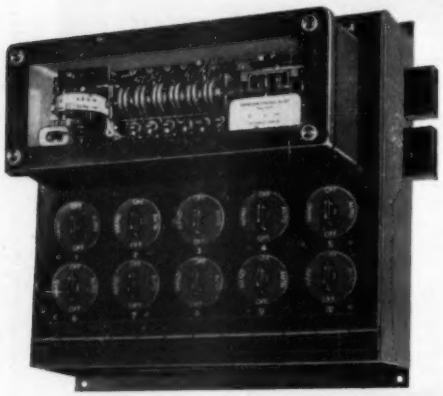

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10 JANUARY 1958

ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

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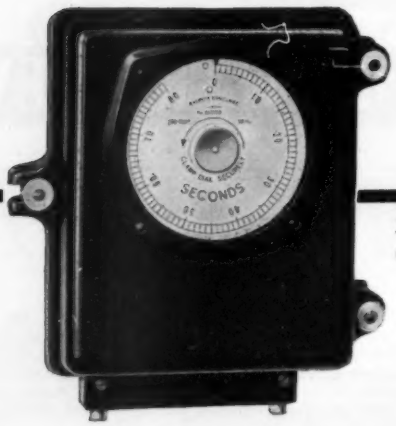

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ELECTRICAL REVIEW

10 January 1958 Vol. 162 No. 2 Established 1872

Advances in Generation

UPON the turn of the year the Central Electricity Authority ceased to exist and its functions were taken over by the new Electricity Council and the Central Electricity Generating Board. During the last year of its operation the C.E.A. installed new generating plant representing an additional output capacity of 1,788 MW, which is nearly 3½ times the amount of plant commissioned during the first year of public ownership. The electricity supply industry's achievement reflects great credit on the Authority's construction staff, the plant manufacturers, civil engineering contractors and all those concerned in the building and equipment of power stations.

The British electricity supply industry has now been nationalised for nearly ten years and during this time considerable progress has been made. In the first place the industry has doubled in size; the amount of generating plant available to meet consumer requirements has doubled; and the actual amount of electricity sold has more than doubled. Moreover, provision has been made to meet the anticipated doubling of demand again in the next decade. The national generating capacity in 1948 was 10,362 MW, in 1957 it was 20,644 MW, and by 1965 it will be about 36,000 MW.

The technological and other advances that have resulted from the large-scale operations, made possible by the national co-ordination of the electricity supply industry, have been outstanding. Whereas in 1947–48 the majority of generating sets on order were of 30 MW and 60 MW size, units of 100 MW and 120 MW are now coming into operation and sets of 200 MW and 275 MW are on order. Furthermore, a 550 MW set consisting of two 275 MW sets in cross-compound is now being designed. With the increase in the size of generating sets more advanced steam conditions have been used, the extent of this advance being from 600 p.s.i. and 850 deg F for the 30 MW sets to 2,350 p.s.i. and 1,050 deg F (with reheat) for the 200 MW set and comparable conditions for the proposed 275 MW and 550 MW units. This expansion in size will raise the attainable generating efficiency from well under 30 per cent for the 30 MW sets to about 37 per cent for the 200 MW units, and slightly more for the 275 and 550 MW machines. The highest thermal efficiencies at which the best modern stations are operating are from 30 to 31·5 per cent and the average efficiency of generation for all the Authority's stations last year was 24·93 per cent. Although the last figure may seem low, it is a substantial advance on the average efficiency of 20·91 per cent in 1947–48.

Another development which has taken place has been in the size of power station buildings. Stations being built ten years ago required from 48 to 60 cu ft per kW of

plant capacity. By using larger generating sets this has been brought down to 35 cu ft/kW and will be still lower, about 28 cu ft/kW, when even larger sets come into operation in 1959 to 1962. This has resulted in a very great saving in civil engineering costs. The growth in size of the boilers and generating sets, with higher steam conditions and consequential improved efficiency, has also materially reduced the cost per kW of plant now being installed. For instance, stations with thermal efficiencies of about 25 per cent cost £50/kW ten years ago. Since that time, although costs have risen by about 75 per cent, recently built stations have cost about £45 per kW and have thermal efficiencies of about 33·5 per cent. Thus the electricity supply industry has a solid record of achievement during the past ten years and we look to the new organisation to do even better.

SUPPORT FOR BRUSSELS

Only three months remain before the opening of the Brussels Universal and International Exhibition in which the British electrical and allied industries are combining to put on a representative display of achievement and ability. In this issue we publish a list of the associations and companies which are contributing towards these collective exhibits—about 140 of them.

There are no doubt many firms who have delayed their decision to contribute, thinking that there was time enough. But now the Organising Committee wishes to go ahead with the printing of the special souvenir brochure and the preparation of panels which will form part of the exhibit and so any firms who wish their names to be included should immediately notify the secretary of the Committee. It will not be essential at this stage to specify the amount of the contribution but the intention to subscribe should be made known.

NEW ZEALAND'S IMPORT CUTS

In view of the fall in the prices of agricultural products and the more recent high level of foreign spending, the New Zealand Government's decision to reimpose a system of import licensing for all commodities was not unexpected. It has been stated that there is no suggestion in the new import control policy of retaliation or bargaining, but it could, none the less, have serious immediate and eventual effects on certain sections of the British electrical industry.

During 1956, which is to be taken as the base year in determining the import allocations, New Zealand's total electrical imports fell by nearly £2 million to £14·5 million, of which British firms supplied £10·5 million. The greater part of the imports consisted of capital goods, particularly cables, telecommunication and distribution equipment, and it is probable that these will suffer less than the so-called " non-essential " items. The value of British domestic appliances imported in 1956 was £1,300,000. Details of the allocations are not yet available for all classes of goods, but of the cuts announced that of 25 per cent on electric motors will represent a reduction of about £175,000 in British imports and that of 75 per cent on electric shavers and irons a reduction of £169,000.

Since existing orders are to be honoured the effects of the restrictions may not be felt immediately by many firms. Stocks held in New Zealand will also act as a cushion. If the restrictions last for some time they will not only result in a considerable reduction in orders from one of the electrical industry's principal markets, but they will act as a stimulus to local manufacture. Furthermore, they are a serious discouragement to those firms who have spent time and money in developing the New Zealand market, and it may possibly discourage their efforts in other markets.

DIESEL GENERATION

Although the varying conditions under which diesel engine installations operate (ranging from standby and peak load duties to continuous running) make it difficult to assess overall performance, the itemised technical particulars and working costs issued each year by the Diesel Engineers' and Users' Association can give a reasonably clear idea of the general position.

The Association's report for 1956-57, now available, deals with 434 engines in 97 installations, 78 of which are for generating electricity—46 in Great Britain and 32 overseas. The largest British station is the 10 MW station at Ashford (Kent), which contains five 2 MW sets and is one of the 21 diesel stations of the former Central Electricity Authority. Views and comments of operators give information likely to be useful on several practical points. Availability appears to have been high. Such troubles as were experienced mainly involved cracked cylinder heads, seized pistons, and ball and roller bearings of governors.

NUCLEAR FUSION

Speaking in San Francisco last week, Sir David Eccles (President of the Board of Trade) is reported in the *Daily Telegraph* to have said that Britain is " very nearly there " in its efforts to produce unlimited peaceful " H-power," i.e., from fusion of the nuclei of hydrogen isotopes. If his hope is fulfilled it implies astonishing progress in thermonuclear research at Harwell, a statement on which has been promised by the Government at an early date. It is one thing to cause an explosion, however; quite another to control the effect economically for a useful purpose, as experience with (uranium) nuclear fission has shown.

It is only about 2½ years ago that many authorities on the subject regarded as unduly optimistic a prediction by Dr. H. J. Babha, recorded here, that means of liberating nuclear-fusion energy in a controlled manner would be found within the next two decades.

TESTING AIR-BLAST CIRCUIT-BREAKERS

Pending the publication of a British Standard for the testing of air-blast circuit-breakers, the Association of Short-Circuit Testing Authorities has issued a set of rules to secure uniformity in interpreting results and assessing performances, on the results of which certificates of short-circuit rating will be based. As other problems arise they will be included in later editions of the rules. Values of circuit severity (i.e. rate of rise of restriking voltage and amplitude factor) are now under discussion and for the time being are subject to the provision that the inherent test-circuit severity for each of the test duties shall not be less than the appropriate rated circuit severity assigned to the breaker.

Electricity in the Chemical Industry

Special Requirements and Types of Equipment Used

By S. HARDY*

MANY aspects of the utilisation of electricity in the chemical industry have previously been covered, notably by D. B. Hogg, at the Institution of Electrical Engineers, and by G. Nonhebel, in 1955, at the British Electrical Power Convention held at Brighton. The present article is in effect an enlargement of some kindly-received comments sent to the last-mentioned author following this Convention.

As the vast and ever-growing chemical industry expands, introducing to the world a progression of new and interesting products, viewpoints on the use of electricity in the industry are bound to change, yesterday's ideas merging via experiment into the practice of to-day. Chemical plants differ widely according to the nature of the material being processed. While perfumery, pharmaceutical preparations and chemical foods are being packaged in architect-designed, modern buildings of glass and chromium, acids, alkalis and fertilisers emerge from what may be nothing more than corroded corrugated sheds. At the same time as chemical preparations and batch processes are taking place quietly in conventional factory buildings, oil-refining and distillation plants tower their spectacular way upwards entirely unclad.

Most chemical plants of whatever type have one basic need; an ample power supply, and many of them for one reason or another, necessary isolation (as with explosives) or rapid expansion, have found themselves ill-served in the matter of public supplies. Further, there is an increasing tendency throughout the industry to work continuous processes to a more and more exacting standard, which involves close margins of measurement and automatic control, and the installation of equipment of an expensive and intricate nature. To this must be added a rigid safety obligation.

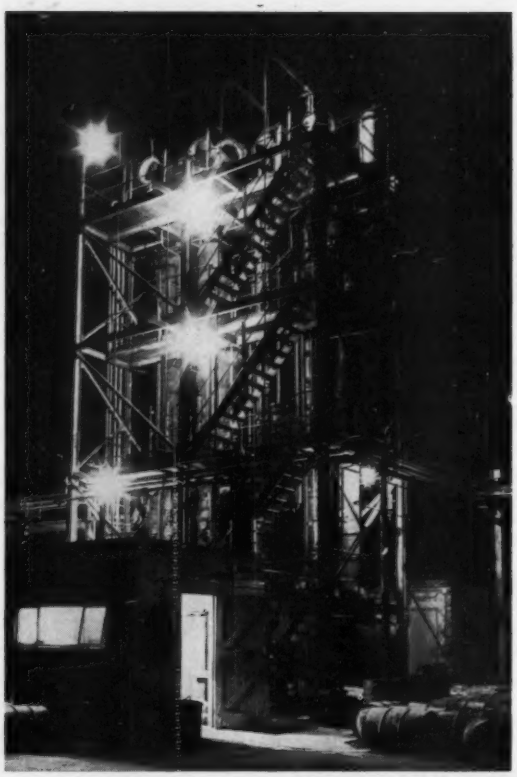
These factors combine to demand:—

1. An adequate source of electric power, not subject to failure.
2. A reliable and easily maintained system of distribution.
3. Plant, equipment and apparatus of sound design and first-class performance.
4. A very high standard of skill, knowledge and adaptability in the engineering personnel.

Power Supplies

Although the chemical industry uses more power than any other, and generates a fair proportion of it, many companies operating stations of imposing size, few chemical plants generate all they require. With the continued extension of the national electricity grid into rural areas, and the persistent rise in the cost of raw fuel, constant watch must be kept on the economics of private power generation.

Many people have discussed the relative merits of pass-out and back-pressure generation, and will doubtless continue to do so. So much depends on local conditions; opinion generally seems to indicate that the system combining economy, elasticity and reliability is back-pressure generation in line with the process steam demand with the h.v. alternators in parallel with the grid. The large new chemical combines have stations designed around this method, or a combination of back-pressure and pass-out generation.



Night photograph of an uncladded distillation plant

The pioneer companies, operating at a time when rural electrification was unreliable, inadequate or wholly lacking, were forced very early into self-generation usually of the pass-out form, and in the process had to tie up a considerable amount of badly needed capital. Some of these stations are still operating, usually at voltages below 500, and by rigid economy and attention to boiler and steam-raising efficiencies, continue to provide power at a cost not much different from that imposed by the Area Boards.

There is, however, a growing tendency throughout the chemical industry to demand steam at higher and still higher pass-out pressures, which destroys to a marked extent the value of this sort of generation. It is vital to pass out at the lowest possible pressures and it is obviously impossible to do it where the processes demand high pressures.

Following the prevailing pattern throughout industry

* B.X. Plastics, Ltd.

generally, the early chemical plants were built with boiler houses and, consequently, generating stations, roughly in the centre of the area to be occupied by the proposed process plant. Steam and power services then radiated from them in finger-like formation, with the heaviest demands as near the supply point as possible.

A progressive firm naturally wants to develop or explore new lines of production while keeping on with its established bread winners. This may call for structural expansion far beyond what was originally envisaged. In these circumstances, new projects of considerable power demand arise on the perimeter of the existing factory, at the extreme ends of the finger tips. This problem, which is not confined to chemical plants, has found its own solution in ring-main systems which operate at high voltages determined largely by existing conditions. Modern practice tends to standardise the voltage of such systems at 11 kV though some of the larger organisations take supplies from Area Boards at 33 and 66 kV and even from the 132 kV grid.

The development and growth of industrial networks bring in their train the problems of electrical maintenance, isolation and protection. The electrical power demand is naturally dependent on the nature and amount of raw material to be processed. Very large-scale operation has already created at least one system where possible fault conditions of the order of 750 MVA at 11 kV are quoted. Serious as this is, for every engineer perplexed by this size of problem there are many who find extreme fault currents at lower voltages an even greater one. People who read the booklet published quarterly by the Ministry of Labour and National Service, also the journals circulated by some of the industrial insurance companies, will be aware of the distressing number of instances where the risk has not even been appreciated.

Reference has already been made to generation and distribution systems at the lower voltages originated in the early days of the industry. With an old "inherited" system on which piecemeal improvements have been imposed, fault currents may develop beyond the clearing capacity of the switchgear.

Certain expedients as an alternative to stepping up the voltage may assist in this problem, but under expanding conditions can afford only temporary relief. Company directors, like most other people, are reluctant to expend huge capital sums for which there is no obvious return, but the results of an explosion caused by the failure of older switchgear, which does not comply with the relevant B.S. and has not passed through a modern testing station, to handle short-circuit faults may teach a disastrous lesson.

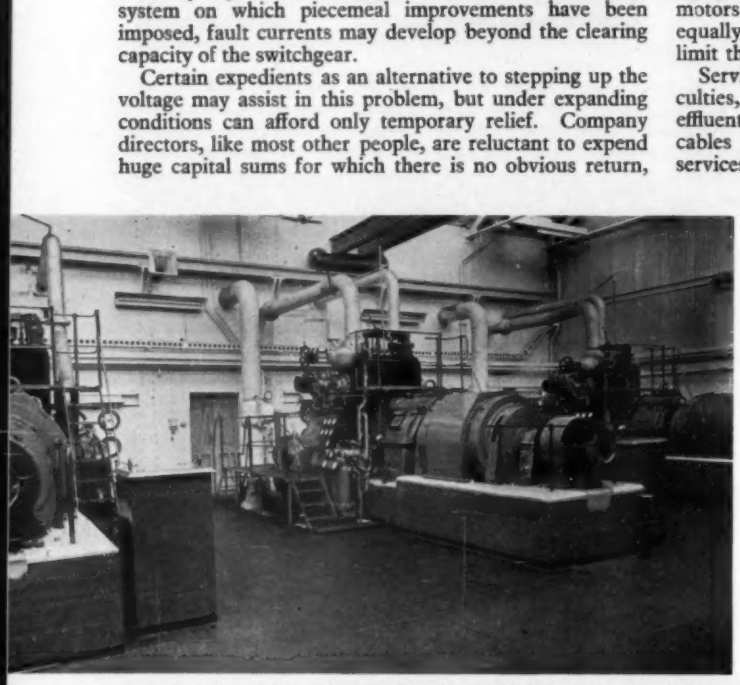
Planned maintenance in industry generally has by now come to be regarded as essential. In the chemical industry it is vital, particularly where continuous working of the plant is normal and where interruption of supply results in its total or partial destruction. Duplication of equipment is a costly business and there are limits, both practical and economic, beyond which it would be foolish to go, but far more consideration should be given in these circumstances to distribution layouts, with special attention to duplicate busbars and sectionalised units with bus-couplers. A comparatively simple arrangement can usually be devised, which can be provided with a suitable mimic diagram and adequately interlocked. This will facilitate isolation and enable maintenance to be carried out at the most convenient time.

Alternative Supplies

The question of alternative supplies to essential plant provides another problem where over-elaboration can be unnecessarily expensive, but one which constantly exercises the minds of both engineer and production manager. To be fully effective change-over schemes should be, at any rate in the initial stages, automatic in operation. Generally, two electrical supplies are involved, steam-generated supported by grid or grid supported by diesel. High-speed contactor switchgear suitably biased and interlocked is then necessary though a certain amount of timing is generally required. The ideal is that which gives sufficient delay to prevent flash-over between the two supplies, particularly during intermittent interruptions, and yet takes advantage of the inertia of the moving parts of the process plant. There is obviously no advantage to be gained by having fully automatic change-over equipment, and then having to go round the plant starting motors from rest because of current surge tripping. It is equally obvious that special precautions must be taken to limit the swing-over current of exceptionally heavy units.

Service installations in chemical factories present difficulties, particularly when soil contamination through effluent discharge either requires that buried pipes and cables receive special coating or prohibits the laying of services in the ground. Arrangements are usually made to group services and it is generally simpler and cheaper to do this above ground. The illustration of a typical arrangement is interesting for two reasons; it shows clearly the gradual development of the area which it feeds and the novel use of ordinary "air strip" track formed into a supporting trough for armoured cables.

The weight factor can be of considerable importance in above-ground service systems, and for that reason, quite apart from the high cost of copper, many engineers are looking to and, indeed, making greater use of aluminium in cables, particularly for sheathing which obviates the necessity for armouring. The application of aluminium for conductors is by no means new to the chemical industry; one factory, at least, has aluminium conductors of considerable size which were a revolutionary innovation when first installed 40 years ago and have done duty satisfactorily ever since. Where aluminium as sheathing is proposed, care is necessary in assessing the local conditions and the purity of the metal should be examined. Impurities lead to pitting and failure.



Typical industrial power house showing three 1,250 kW, 415 V turbo-alternators

The effect of possible surges in the system due to the starting, reversing or plugging of very large items of plant with obstinate starting and load characteristics must be considered. These phenomena are frequently to be met with and despite careful and special motor design, time delays of comparatively long duration may have to be included in the starting circuit. The whole question of time delays requires most careful examination, because their effect is cumulative throughout a system. Fault conditions near the source of supply in these circumstances can produce a most dangerous situation.

Plant, Equipment and Apparatus

The suppliers of electrical equipment are in the main interested only in flow-line products normally designed for a competitive market. Chemical plants often demand "specials" which entail long delivery. To minimise delays, therefore, most engineers tend to "work in" standard equipment wherever possible. While tribute must be paid to the remarkable way in which some of this has stood up to conditions for which it was neither designed nor intended, there is a real demand for something more robust and lasting; a demand which, until quite recently, was being met with little enthusiasm on the part of the electrical manufacturers.

Over the last few years, however, there has been a change, and it is interesting to see how the chemical industry itself has contributed to this change by:—

(1) The outcome of its own development and research into (*a*) silicone insulations and varnishes; (*b*) fabricated plastic shapes and extruded tubes, sleeves and coatings; and (*c*) the successful application of polythene, polystyrene, nylon, etc., to ordinary manufacturing techniques.

(2) The publication of photographs and descriptions in the technical Press and through other media of interesting jobs of considerable magnitude and attractive appearance, thereby providing an excellent advertisement for the respective manufacturers.

Motors

All the known types and enclosures of motors at constant and variable speeds are in use in the chemical industry; the characteristics of each are sufficiently well known to need no description here. Chemical plants, however, do demand first-class performance combined, in many cases, with imperviousness to corrosive fumes and moisture. Some engineers in chemical plants are sorry that the prevailing search for higher electrical efficiencies coupled with lower production costs has brought about the discontinuation of the old type totally-enclosed squirrel-cage motor with its heavy cast frame, large flanges and deep spigots.

This equipment with nothing added to its standard winding than a superficial coating of anti-sulphuric enamel, has put up some remarkably lasting performances under very severe conditions. Whilst it is true that the introduction of new materials has had a tremendous influence on motor winding and slot-insulation design, the care of the outer casing has been left very much to the user. External housings of wood or stainless steel have often been the solution, but recently intimate coatings of nylon, resin-bonded fibreglass, sprayed p.v.c. or epikote resins have been applied with success. Some of the newer machines designed specifically for the chemical industry and listed as "corrosion-proof off the shelf" products, are being watched with interest.

There is no doubt that the use of silicones for the insulation of motor windings is now established. The plant engineer can therefore obtain plant with windings

View of industrial power house showing switchboard relay panel and some l.v. switchgear

resistant to corrosion and, because of a higher permitted temperature rise, with a corresponding reduction of frame size for a given horsepower.

Higher winding temperatures, particularly where forced air or water cooling is difficult, mean higher carcase temperatures, and these can constitute a real problem in inflammable and dust-laden atmospheres. In this connection the chemical interests are moving for a new B.S. to cover motors with special dust-proof enclosures.

In the case of variable-speed drives, electronics are playing their part. For example, in a known case use is being made of thyratrons to provide excitation in large Ward-Leonard d.c. equipment in order that certain ancillary drives may keep absolutely in step with the main medium.

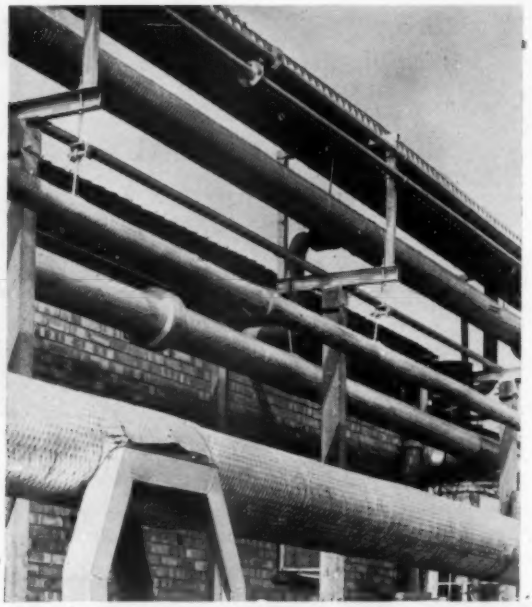
It is unfortunate, however, that the chemical industry has still to go into the German or American markets, as happens in the plastics field, for reeling and similar drives where processed material has to be maintained at a constant tension as the diameter of the spool increases. British motor manufacturers show a regrettable lack of interest in an application which is most surely increasing in demand.

Starters and Switchgear

Very great use is still being made of oil-immersed starters and switchgear, not only because of the arc-quenching properties of the oil, but because of the protection it affords against contact corrosion. Local heating due to oxidation of contacts can, and does, occur if such gear is infrequently operated.

Increased automation has been extensively taking place in the chemical industry during the whole of this century, and it requires an increasing amount of contactor-type switch and starting gear, usually of the air-break variety. Here again it is interesting to note recent developments such as the introduction of oil-immersed automatic switchgear, the development of special "chemical works" enclosures for air-break contactor gear, and the availability of special preparations for (*a*) the coating of contacts, and (*b*) the sealing of frames and flanges.

As an interesting development of increased automation and instrumentation, particularly where it is necessary to control a mixed arrangement of indoor and outdoor chemical plant of some magnitude from one central position, use is often made of the group-starting type of switchboard. This may consist of a considerable number



Arrangement of above-ground services

of starters, each in a miniature cubicle, mounted as a comprehensive unit in a flush sheer-fronted board. When designed to take the same general form and finish as the instrument panel and suitably aligned beside it, the whole can present a most attractive arrangement.

A careful selection must be made from the multiplicity of switch- and fuse-gear available to the industrial user. Various types and makes of otherwise sound construction have some undesirable feature which either requires modification or makes the gear radically unsuitable. Many manufacturers still provide three holes with knock-outs in the casings of their gear. These holes generally require slotting together by the user in order to prevent inductance before he can assemble the units into a composite board. At a recent exhibition, one well-known manufacturer, in introducing a new range for industrial use, displayed numbers of t.p. and n. busbar chambers, switch-fuses, etc., assembled and connected as a complete industrial switchboard. All the units so assembled had each of the three-phase wires passing through a separate hole in the steel casing.

Installations

For the smaller sizes of wiring most of the recognised systems, e.g. conduit (steel and alloy), mineral-insulated, rubber, cambric and plastic-insulated, have been tried. Each has its adherents, but it is recognised in industry generally that each has its application. The chemical industry demands special care in selection because in addition to manufacturing elements corrosive to metal, some factories use and process solvents which attack rubber, cambric and similar substances. Segregation of processes generally enables a suitable system to be utilised.

As an example of what can be done a project in a nitration plant is now taking place, whereby the whole of the nitric fume plant, the conduit system, and even the fluorescent lighting fittings are being manufactured in one of the rigid vinyls. The components are being produced in the correctly coded colour which, of course, will be permanent, and being at the same time impervious to corrosion, an indestructible, maintenance-free installation should result. As a contrast there are situations even in chemical factories where a perfectly simple solution is available as, for example, a computer installation supplied from an overhead " grid " system.

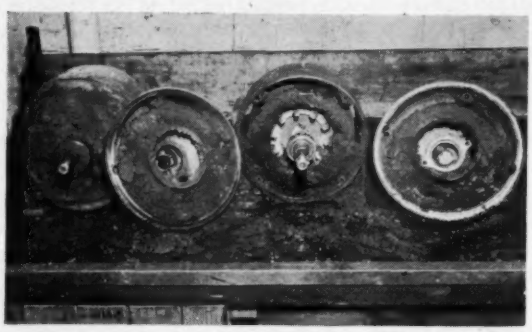
Flameproof Installations

Many chemical plants require the whole or part of their power and lighting installations to be carried out in flameproof or intrinsically-safe equipment. A new B.S. has been prepared to cover this requirement. Flameproof equipment is bulky and, to the mind of some engineers, unduly expensive. It is also costly to install. For this reason, compromises are sometimes made. For example, where a pump unit is used for transferring inflammable liquids, the motor and the starter are flameproof, while conduit or wiring is of the flameproof type only in the immediate vicinity. Such compromises are reasonable in the open, but inside buildings they should only be embarked upon after most careful consideration. Provided that the proper glands and seals are used, mineral-insulated cable is very adaptable to flameproof work; it is not subject to pressure piling as is conduit. For an explosion to occur, two factors must be present: (*a*) an inflammable concentration, and (*b*) a source of ignition; and the installation of expensive, correctly certified gear can be completely nullified if conduit systems are not selected and installed with the utmost care, with intervening barriers and stopping boxes.

Suitable interlocked air-purged or light-pressure gas-filled systems (e.g. nitrogen or carbon dioxide) are used where atmospheres not at present covered by an appropriate Buxton certificate occur. Their employment demands rigorous maintenance, constant attention to flanges and joints, and examination for pitting due to corrosion, particularly in the case of die-cast aluminium components, for there is little point in eliminating one hazard only to introduce another, in the release to atmosphere of toxic substances.

There is a real need in the chemical industry, possibly in other industries also, apparently not at present catered for. It is for a flameproof lighting fitting of the bulkhead type with a removable backplate for easy renewal of the lamp, a process normally carried out by the removal of the front glass. The application is the illumination of inspection chambers where this must be done from outside the chamber. The usual practice is to mount the fitting close up to a window in the chamber. This requires the provision of some flexibility in the cable entry, and the hingeing of the mounting in some way, not always a satisfactory arrangement when dealing with flameproof apparatus.

Flameproofing and portability are by no means synony-

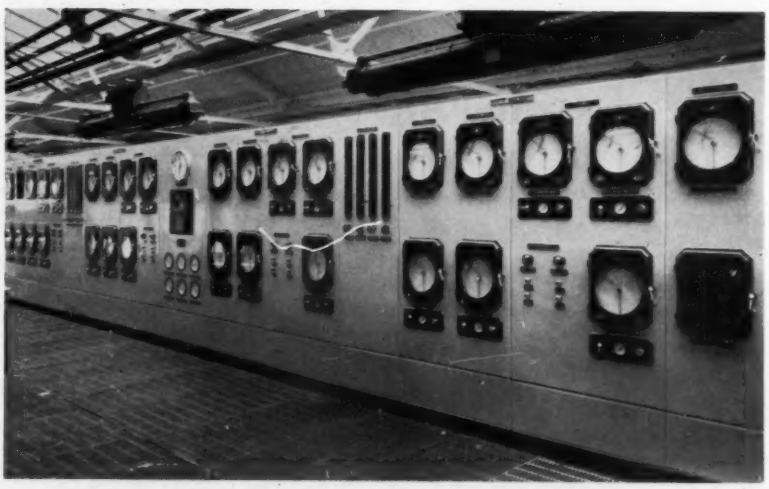


An example of conditions likely to be encountered in chemical factories

mous terms, and though flameproof portable equipment is provided and certified its introduction should be confined to cases of absolute necessity, with approved flexibles, glands and protective switchgear.

Instrumentation

The chemical industry can legitimately take pride in being the first, not only to realise the possibilities of instrumentation, but also to put into effect this far-reaching technique for the correct assessment and control of process conditions. Descriptions of some of the major industrial instrumentation projects have appeared in the technical Press, and it is not the intention to add a great deal to them here. In the earlier days, compressed air came to be adopted as the controlling medium, largely because there was not sufficient Buxton-certified or intrinsically-safe electrical equipment available for use in inflammable situations.



Typical instrument panel with flameproof lighting above

Whatever the medium, certain basic principles must still be borne in mind. One is that even the most expensive and skilfully designed instruments cannot give proper control unless the design and arrangement of plant enables them to do so. In the matter of temperature control, for example, the necessity of closely matching the amount of applied heat to the job in hand, with suitable lagging to prevent heat loss, is obvious and yet so frequently overlooked.

There are several facets of the subject under review which for obvious reasons must either be omitted or dealt with briefly. For example, although equipment under the heading of communications, pilot systems, alarms, and warning devices usually operates at medium or low voltage, as much or more care is required in its selection and installation as in the case of heavy duty apparatus, which is usually of a more robust nature. Switch or key operated intercom. systems are to be preferred to dial types, because in many instances, process personnel wear protective gloves. This, of course, requires the apparatus to be of heavy construction.

Warning devices giving an indication of chemical change are quite common in extended chemical plants, and as an indication, a brief specification of one small scheme designed to cover power failure in buildings supplied by a remotely situated furnace-fired hot oil circulating system follows:—

Power Failure Alarm

(1) Each of three hot oil circulating pump motors will be fitted with a centrifugal switch, belt driven from the pump side of motor driven coupling.

(2) Each of these switches, on failure of motion, will: (*a*) sound three klaxons in specified places; (*b*) trip the respective automatic stoker drive.

(3) Modifications to the pump motor isolators will prevent the alarm from operating whilst that particular pump is out of service.

(4) The alarm and tripping portion of the circuit will be operated from batteries constantly trickle-charged.

Power factor is a point of practical interest in chemical plants, as indeed in others, and since most consumers pay on kVA demand, it is in the interests of the user as well as of the Area Boards to improve it.

Although much has been written on the subject of portable apparatus, far too many industrial accidents arise from its use. What constitutes a safe voltage and what are the practical limitations could be argued for ever. The responsibility for safety rests with three groups of people—the employer, the manufacturer of the apparatus, and the user.

The writer has felt it worth while in the case of his own organisation to prepare a film strip illustrating this triple responsibility. While the strip sets out quite clearly the duties of the two first-named groups, its primary purpose is to instruct the users, and it contains a number of photographs taken from actual operation. Each of these depicts an example of carelessness or unwittingly wrong use, with suggested remedies.

Returning to the employer's responsibility, many factories have introduced their own low-voltage systems with or without monitored earths. Many people, however, are of the opinion that the problem will not finally be resolved without some form of legislation which provides a standard system of supply with compulsory instruction of employees.

The Future

There is no doubt that the chemical industry is firmly and steadily moving into a new era. Already its pioneer work in the fields of automation, instrumentation and computation has produced equipment fascinating in its ingenuity and almost unbelievable in its possibilities. Already too, the derivatives of nuclear fission form part of the normal everyday process plan. Possibly, the principles of atomic reaction are not being utilised in power-raising units for chemical plant as quickly as preliminary optimistic forecasts foretold, but, in the long run, this may be a good thing. Far better for the chemist, the metallurgist and engineer to combine, to take notice of the pioneer atomic power-raising plant at present being developed, and finally to produce for the chemical industry according to its need, embracing the heat requirement as well as the power in a comprehensive scheme.

From the foregoing it would appear that the chemical industry will continue to provide ample scope not only to personnel already engaged in it, but to manufacturers and all willing to accept the challenge.

Generating Plant Extensions

1,903 MW Installed by C.E.A. in 1957

AT the end of 1957 the Central Electricity Authority was dissolved and its functions taken over by the new Electricity Council and the Central Electricity Generating Board. During the last year of its operation the C.E.A. installed new generating plant yielding an additional output capacity of 1,788 MW. This compares with the record figure of 1,797 MW in 1956 and is nearly 3½ times the amount commissioned during the first year of public ownership, ending on 31st March, 1949.

New plant commissioned in the power stations owned by the South of Scotland Electricity Board had an output capacity of 84 MW, making a total of 1,872 MW of generating capacity provided in the area of the former British Electricity Authority.

The additional C.E.A. plant, comprising 35 turbo-alternators with an aggregate installed capacity of 1,903 MW and 41 boilers having an aggregate evaporative capacity of 15,950 klb/hr, was installed in 28 power stations. Four of them were new stations in which plant was installed for the first time. Of the 41 new boilers, two having an aggregate evaporative capacity of 1,100 klb/hr were oil-fired. In addition, at four existing coal-fired stations eight boilers with an aggregate evaporative capacity of 2,860 klb/hr were converted to oil firing.

A new record in speed of construction was set up by the commissioning of the first 60 MW set at Rogerstone power station exactly three years after work started on the virgin site, the second and last set being brought into service three months later. Another outstanding achievement was the commissioning during the year, by three different turbine and two different boiler manufacturers, of five 100 MW units all of 1,500 p.s.i. steam pressure, which can be regarded as prototypes of the larger generating units which will come into service at intervals during the next five-year period for which the Authority has completed plant installation programmes.

The peak demand met by the Authority during the year was 19,311 MW, which was supplied at full voltage and frequency at 5 p.m. on Monday, 16th December. This was 1,643 MW above the peak load met at the beginning of the year, and was over 124 per cent above the peak demand of 8,607 MW met in England and Wales in the year before 1st April, 1948.

Concrete Street Lighting Columns

WHEN the first edition of B.S. 1308 was issued in 1946 it dealt solely with requirements for reinforced concrete street lighting columns. In the latest revised edition the scope of the Standard has been extended to include columns of pre-stressed concrete, specification details for which were drawn up in the light of the results of a series of tests. The Standard is predominantly one of quality and performance. In the foreword it is stated that the columns are not intended for overhead wiring, for which columns should be specially designed.

Requirements are specified for three classes of column with a range of heights of 30, 25 and 15 to 13ft. The design of the columns is left to the discretion of the manufacturer, subject only to compliance with the requirements for concrete, reinforcement, cover, finish, spigots, nipples, ladder arms and service connections, and with the tests.

One clause will help to simplify what has become known as the "purchasing function." It contains eleven items of information (cross-references to the appropriate clauses) which a purchaser should furnish with his order.

Copies of B.S. 1308 may be obtained from the British Standards Institution, 2, Park Street, W.1, price 5s.

PLANT COMMISSIONED BY THE C.E.A. IN 1957

Name of Station	Division	Turbo-Alternator Plant		Boiler Plant		Main H.P. Pipework
		Installed Capacity MW	Makers	Capacity klb/hr	Makers	Makers
Steam Plant						
Acton Lane "B"	London	2×30	Richardsons, Westgarth	2×240	Mitchell Eng.	Aiton
Barking "C"	London	—	—	1×540	Babcock & Wilcox	Aiton
Bold "A"	N. West, Merseyside & N. Wales	—	—	1×300	Yarrow	Aiton
Brighton "B"	South Eastern	1×60	Richardsons, Westgarth	2×320	Babcock & Wilcox	C. A. Parsons
Carmarthen Bay	South Wales	—	—	1×240	Babcock & Wilcox	Stewarts & Lloyds
Castle Donington	East Midlands	3×100	Metropolitan-Vickers	2×830	Babcock & Wilcox	Aiton
Chadderton "B"	N. West, Merseyside & N. Wales	1×60	Metropolitan-Vickers	2×360	Simon-Carves	Stewarts & Lloyds
Connah's Quay	N. West, Merseyside & N. Wales	1×30	C. A. Parsons	1×300	International Combustion	John Thompson
Deptford East H.P.	London	1×52	Metropolitan-Vickers	—	—	John Thompson
East Yelland	South Western	1×31	C. A. Parsons	1×180	John Thompson	C. A. Parsons
Ferrybridge "B"*	Yorkshire	1×100	C. A. Parsons	1×760	Stirling Boiler/Babcock & Wilcox	Stewarts & Lloyds
Goldington	Eastern	1×30	British Thomson-Houston	1×300	Clarke Chapman	Stewarts & Lloyds
Hackney "B"	London	1×30	C. A. Parsons	1×300	Simon-Carves	C. A. Parsons
Hams Hall "C"	Midlands	3×60	General Electric Co.	3×550	Simon-Carves	Stewarts & Lloyds
Huncoat	N. West, Merseyside & N. Wales	1×30	General Electric Co.	1×305	Simon-Carves	C. A. Parsons
Lincoln	East Midlands	2×20	Brush	4×120	Richardsons, Westgarth	Aiton
Marchwood	Southern	1×60	English Electric	1×550	John Thompson	John Thompson
Meaford "B"	Midlands	2×60	British Thomson-Houston	1×515	Babcock & Wilcox	Babcock & Wilcox
Mexborough	Yorkshire	2×30	English Electric	3×180	Richardsons, Westgarth	Aiton
Nottingham H.P.	East Midlands	1×60	Metropolitan-Vickers	1×300	Mitchell Eng.	Aiton
Ocker Hill	Midlands	—	—	1×180	Babcock & Wilcox	Aiton
Portishead "B"	South Western	2×65	Metropolitan-Vickers	3×300	Mitchell Eng.	Stewarts & Lloyds
Rogerstone*	South Wales	2×60	C. A. Parsons	2×550	Babcock & Wilcox	Babcock & Wilcox
South Denes*	Eastern	1×60	Metropolitan-Vickers	1×550	International Combustion	Stewarts & Lloyds
Tilbury "A"	Eastern	2×60	C. A. Parsons	2×540	John Thompson	John Thompson
Wakefield "B"	Yorkshire	1×60	English Electric	1×550	Foster Wheeler	Aiton
Willington "A"*	East Midlands	1×100	English Electric	1×830	International Combustion	Aiton
	Totals 34 and 1,893·5 MW			Totals 41 and 15,950 klb/hr		
Hydro Plant		**MW**				
Dolgarrog	N. West, Merseyside & N. Wales	1×10	Boving & Co.			

* Stations in which plant was commissioned for the first time in 1957.

RUBBER-INSULATED CABLES

Changes in British Standards

IN a communication which we have just received from the Cable Makers' Association, Mr. B. B. Evans, B.Sc., F.R.I.C., reviews recent developments in British Standards for rubber cables. He begins by pointing out that for some time discussions have been proceeding in the British Standards Institution, first, to consider, and in general act on, certain recommendations from the Commonwealth Conference on Standards for Electric Cables, held in London in 1953 and, second, to take advantage of more economical constructions made possible by modern manufacturing processes. The first group of activities has been concerned basically with modified insulating and sheathing compounds; the second with the omission of tape from the common sizes of conduit wiring cables. These discussions have been brought to successful conclusions which will result in amendments to British Standard 7 : 1953 for rubber-insulated cables and flexible cords and related specifications. The object of the present article is to summarise these amendments and to indicate briefly their background.

Composition and performance requirements for insulations and sheaths are contained in B.S. 7 : 1953. These same compounds are used on cables covered by a number of other British Standards and it was recognised that the situation would be improved if, instead of repeating the composition and test clauses in all these specifications, such clauses were embodied in a new British Standard, to which appropriate reference could be made in the various cable specifications. This rearrangement would also have the additional merit of eliminating the necessity for issuing individual amendments to the various cable Standards if and when an amendment relating to the insulation or sheath is required.

When, therefore, the 1953 Commonwealth Cable Conference recommendations regarding compounds became available it seemed opportune to embody these in a separate British Standard. It was further agreed that this new British Standard would cater for three types of insulation: general purpose vulcanised rubber, fire resisting, and ozone resisting, and for the existing four types of sheath, i.e. general purpose and heavy duty rubber and polychloroprene respectively. These will now be considered briefly.

Alteration of Compounds

Hitherto where British specifications have laid down limits for the rubber content of compounds these have been specified by weight. It will be realised, however, that in the manufacture of cables, these compounds are applied in specified thicknesses to length of conductor and are in fact used in terms of volume, i.e. cross-sectional area multiplied by length. The 1953 conference therefore suggested that where specifications lay down limits for rubber or other elastomer in compounds they should be defined by volume, and this practice has been generally adopted in the new British Standard for both insulation and sheath.

General Purpose Vulcanised Rubber Insulation

The useful life of a vulcanised-rubber-insulated cable is determined largely by the ability of the insulation and sheath to resist oxidation. The aspects of compound formulation necessary to ensure this are now well understood and can be applied quite readily to a wide range of compounds irrespective of the actual amounts of rubber in the compound.

As a matter of convenience the limits of the rubber content in the B.S. 7 : 1953 compound were set at 45 per cent by weight minimum and 50 per cent by weight maximum, which in conjunction with the types of compounding ingredient normally used, result in a compound containing about 70 to 75 per cent by volume of rubber. Based on operating experience under a variety of climatic conditions the 1953 conference suggested a lower rubber content with limits of 50 per cent by volume minimum and 60 per cent by volume maximum. Technically speaking, with the scientific background referred to, it was a comparatively simple matter to draft the appropriate requirements. As the rubber content is lower, the tensile strength is lower; accordingly, the minimum tensile strength has been set in the new specification at 1,250 p.s.i., but those parts of the specification which control the ageing resistance are identical with those of B.S. 7 : 1953.

In routine factory testing, insulation resistance is normally measured within about 48 hr of vulcanisation of the rubber-insulated core. When core manufactured by modern techniques with the reduced rubber content insulation is thus tested the insulation resistance is very much lower than specified in B.S. 7 : 1953 and to cater for this the minimum values which will be specified in an amendment to B.S. 7 and other British Standards for vulcanised rubber-insulated cables are reduced to 25 per cent of those in B.S. 7 : 1953; this same reduction in insulation resistance values will also be made in other cable specifications employing the same insulation, e.g. B.S. 883, 708, etc. Calculations have indicated that values even of this order would not require any alteration to the Institution of Electrical Engineers' Wiring Regulations. In practice, of course, the actual values even from routine testing will be above the minimum and it is known that a further pronounced rise will begin within a week or so of vulcanisation. This and the fact that spark testing requirements are the same as in B.S. 7 : 1953 ensure more than adequate electrical properties.

Suitable tests carried out by members of the C.M.A. have indicated that in such features as resistance to mechanical damage due to crushing and similar influence, the reduced rubber insulation is at least equal to the present B.S. 7 type and might even be rather better. There is no doubt, therefore, that this new insulation can be accepted by users with every confidence.

Fire-Resisting Insulation

This is a composite insulation having the same dimensions as 250 or 660 V vulcanised rubber types but consisting of an inner layer of vulcanised rubber compound and an outer layer of vulcanised polychloroprene compound, the two being of substantially equal thickness and inseparable. This insulation was originally developed about 20 years ago and has been recognised in B.S. 883 for something approaching ten years. In addition to defining the types of compound in very broad terms the new British Standard contains appropriate physical, ageing and fire-resisting tests for controlling the quality of

this insulation. Cable specifications calling for this insulation will require spark testing and voltage testing as for vulcanised rubber with insulation resistance requirements 80 per cent of those for the new vulcanised rubber insulation.

Ozone-Resisting Insulation

This grade is intended for high-voltage cables and some manufacturers use their own specially formulated, and in some cases composite, insulants with widely differing physical properties, which makes it extremely difficult to lay down physical requirements in a specification. The British Standards Institution therefore took the realistic view that all that was necessary was to require the insulation to pass an ozone-resistance test which has been taken from B.S. 7 : 1953 and put in the new specification, together with the electrical requirements of the appropriate cable specification.

Sheaths

The only practical difference between the sheath requirements of B.S. 7 : 1953 and the new B.S. 2899 : 1958 is that the latter calls for a general purpose rubber sheath with somewhat less rubber than the present Standard. This also involves a reduction in minimum tensile strength to 1,200 p.s.i., but again with limits for the accelerated ageing as in B.S. 7 : 1953. This British Standard has required many manufacturers to use a compound containing more rubber than their experience has shown to be necessary and the new British Standard allows in effect a return to pre-war practice.

Omission of Tape

In the traditional longitudinal method of applying the insulation the unvulcanised core was often taped before being wound on the curing cylinder. This tape was helpful in supporting the rubber during the cure and gave additional mechanical protection to the core in conduit wiring cables. However, much core is now made by continuous vulcanisation in which the rubber compound is extruded on the conductor and the whole passed immediately into the vulcanising tube. Loss of shape, etc., prior to and during vulcanisation is thereby eliminated, and hence also the manufacturing desirability of applying a tape to the core. However, it was considered essential to decide whether the omission of tape would be technically important from the users' standpoint and a large number of experiments on conduit wiring cables were carried out by members of the C.M.A. to decide this point.

In one series quantitative tests were made to check the resistance of the compounded braid to slip back with and without underlying tape; in another, lengths of cable made with both B.S. 7 : 1953 insulation and the new reduced rubber content type, with and without tape, were drawn into conduits with an excessive number of right-angle bends and running joints, subjected to appropriate voltage tests, withdrawn, re-installed and voltage re-applied. In both series cables made with untaped cores behaved satisfactorily and in fact no difference could be found between cables made with taped or untaped cores. In a further series, samples of cable were intentionally badly treated by being crushed and submitted to impact from weights dropped from various heights.

By these very severe tests it was possible to show that the inclusion of tape did give some additional mechanical protection, as would indeed be expected; nevertheless, these tests did emphasise the very pronounced mechanical protection given by compounded braid, even without underlying tape, and the overall conclusion arrived at from a review of the data was that the tape could be omitted from conduit wiring cables without detracting, to any practical degree, from the resistance of cables to installation hazards. Following these laboratory tests arrangements were made with a large user for them to carry out practical installation tests which showed that the cables made without tape were quite satisfactory. In these circumstances it was agreed to omit the tape from smaller sizes of cables and an amendment to B.S. 7 will allow of this.

Future Trends

So much for the immediate future; on looking somewhat further ahead and from a broader viewpoint a general comment on specifications for insulations and sheaths may not be out of place. These can be of two general types. The first type consists essentially of two sections. In the first section a particular type of compound is defined by general composition clauses; the second section consists of specified tests and minimum performance requirements; these do not necessarily bear any direct relation to service conditions, but their main function is to ensure that the specified type of compound has been used and properly manufactured. However, rubber technology is coming to be an exact science and many cable technologists believe that laboratory tests have reached a stage where it should be possible to dispense with composition requirements and to frame a second type of specification consisting only of performance tests and requirements so drawn up that any "rubber" insulation meeting the combination of requirements must necessarily be of satisfactory quality. B.S. 7: 1953 in so far as it deals with quality of insulation is clearly a specification of the first type; B.S. 2899 : 1958 uses the first type for the general purpose vulcanised rubber and fire-resisting insulation, and the second type for the ozone-resisting insulation. It is clear that this second type of specification allows manufacturers more flexibility in choice of materials and this could be a most important consideration in obtaining a measure of price stabilisation.

In view of the known intention to manufacture synthetic rubber in this country and the need to be increasingly competitive in world markets, it is most desirable that specifications should give manufacturers the greatest freedom in producing technically satisfactory cables. With this in view the C.M.A. is conducting experimental work with the object of framing proposals for a British Standard based purely on tests and performance requirements which will ensure an entirely satisfactory product while allowing manufacturers the economic choice of natural or synthetic materials.

The above changes in British Standards for rubber-insulated cables were made effective on 1st January when the British Standards Institution issued a number of new publications: Amendment No. 3 to B.S. 7, "Rubber-insulated cables and flexible cords for electric power and lighting" (P.D. 2935) is available free of charge together with the following amendments necessitated by the changes in B.S. 7: Amendment No. 1 to B.S. 708 : 1957, "Trailing cables for mining purposes" (P.D. 2936); Amendment No. 2 to B.S. 1116 : 1957, "Flexible trailing cables for quarries and metalliferous mines" (P.D. 2937); Amendment No. 3 to B.S. 1862 : 1952, "Cables for vehicles" (P.D. 2938); and Amendment No. 1 to B.S. 2008 : 1953, "Vulcanised rubber-insulated wire armoured cables for collieries" (P.D. 2939). B.S. 883 : 1958, "Cables and flexible cords for electrical equipment of ships" is available at 15s, while the new B.S. 2899: 1958, "Vulcanised rubber insulation and sheath (including polychloroprene) and electric cables" costs 5s.

BRUSSELS EXHIBITION

Supporters of the Electrical Display

GOOD progress is being made with the British Electrical and Allied Industry Section of the Universal and International Exhibition which is being held in Brussels from 17th April to 19th October this year.

From the Organising Committee (36, Kingsway, London, W.C.2) we have received a list of the companies which are supporting the British electrical display. First there are the seven trade associations concerned:—The British Electrical and Allied Manufacturers' Association, the British Radio Equipment Manufacturers' Association, the Cable Makers' Association, the Electric Light Fittings Association, the Radio Communication and Electronic Engineering Association, the Telecommunications Engineering and Manufacturing Association and the Water-Tube Boilermakers' Association.

Then there are over 140 individual concerns whose names are given below. Those marked with an asterisk are contributing to the Domestic Section (in some cases to the rest of the display as well).

A handsome souvenir publication, "Serving the World," is being produced in connection with the British electrical display. It is profusely illustrated and consists of 48 pages (11in by 8½in) summarising the history and achievements of the British electrical and allied industries. A total of 50,000 copies is being printed and half of these are being sent overseas before the Exhibition opens. We reproduce a photograph of the five-colour front cover of the brochure.

The Brussels Exhibition souvenir brochure

A.E.I. Lamp & Lighting Co., Ltd.*
Aidas Electric, Ltd.*
Airedale Electrical & Manufacturing Co., Ltd.
Allen West & Co., Ltd.
W. H. Allen, Sons & Co., Ltd.
Ashley Accessories, Ltd.
Astral Switchgear, Ltd.
Automatic Telephone & Electric Co., Ltd.
Babcock & Wilcox, Ltd.
Bakelite, Ltd.
Bastian & Allen, Ltd.
Belling & Co., Ltd.*
Belliss & Morcom, Ltd.
The Belmos Co., Ltd.
Berec (Gt. Britain), Ltd.*
Berry's Electric, Ltd.*
Best Products, Ltd.*
K. E. Beswick, Ltd.
Birlec, Ltd.
Thomas Bolton & Sons, Ltd.
Boving & Co., Ltd.
E. N. Bray, Ltd.
George Bray & Co., Ltd.
British Federal Welder & Machine Co., Ltd.
British Insulated Callender's Cables, Ltd.
British Thomson-Houston Co., Ltd.
Brookhirst Switchgear, Ltd.
Bruce Peebles & Co., Ltd.
Brush Electrical Engineering Co., Ltd.
Bull Motors (E. R. & F. Turner, Ltd.)
Bullers, Ltd.
Bulpitt & Sons, Ltd.
Burco, Ltd.
Bush Radio, Ltd.*
Cambridge Instrument Co., Ltd.
Chilton Electric Products, Ltd.*
Chloride Batteries, Ltd.
Clarke, Chapman & Co., Ltd.
E. K. Cole, Ltd.*
Contactor Switchgear, Ltd.
Corfield-Sigg, Ltd.*
Cossor Radio & Television, Ltd.*
Crompton Parkinson, Ltd.
Davenport Engineering Co., Ltd.
Dawe Instruments, Ltd.
Decca Radar, Ltd.
Dewhurst & Partner, Ltd.
"Diamond H" Switches, Ltd.
Dimplex, Ltd.*
Donovan Electrical Co., Ltd.
Doulton Industrial Porcelains, Ltd.
Dubilier Condenser Co. (1925), Ltd.
Electric Construction Co., Ltd.
Electric Resistance Furnace Co., Ltd.
Electro Dynamic Construction Co., Ltd.
George Ellison, Ltd.
English Electric Co., Ltd.*
English Electric Valve Co., Ltd.
Ericsson Telephones, Ltd.
Everett, Edgcumbe & Co., Ltd.
Evershed & Vignoles, Ltd.
Falk, Stadelmann & Co., Ltd.*
Ferguson Pailin, Ltd.
Ferranti, Ltd.*
Fi-Cord Co., Ltd.*
V. & E. Friedland, Ltd.*
General Electric Co., Ltd.*
Gilbert Gilkes & Gordon, Ltd.
Griffiths Bros. & Co. (London), Ltd.
G.W.B. Furnaces, Ltd.
Gwynnes Pumps, Ltd.
Hackbridge & Hewittic Electric Co., Ltd.
Harland Engineering Co., Ltd.
Heatrae, Ltd.
W. T. Henley's Telegraph Works Co., Ltd.
Hick, Hargreaves & Co., Ltd.
Hoover, Ltd.*
Hotpoint Electric Appliance Co., Ltd.*
Igranic Electric Co., Ltd.
International Combustion, Ltd.
Jackson Electric Stove Co., Ltd.*
Johnson, Matthey & Co., Ltd.
Johnson & Phillips, Ltd.
George Kent, Ltd.
Kenwood Manufacturing Co., Ltd.*
Lancashire Dynamo Group of Companies
Laurence, Scott & Electromotors, Ltd.
Lincoln Electric Co., Ltd.
Lindley Thompson Transformer & Service Co., Ltd.
London Electric Wire Co. & Smiths, Ltd.
Lumenated Ceilings, Ltd.
Long & Crawford, Ltd.
Lucas Dynamo Group of Cos.
M. & C. Switchgear, Ltd.
M.K. Electric, Ltd.
William McGeoch & Co., Ltd.
Robert Maclaren & Co., Ltd.
Marconi Instruments, Ltd.
Marconi International Marine Communication Co., Ltd.
Marconi's Wireless Telegraph Co., Ltd.
Mather & Platt, Ltd.
Mawdsley's, Ltd.
Metropolitan-Vickers Electrical Co., Ltd.
Micanite & Insulators Co., Ltd.
Midland Electric Manufacturing Co., Ltd.*
Morecambe Electrical Equipment Co., Ltd.
Mullard, Ltd.
Murphy Radio, Ltd.
Nalder Bros. & Thompson, Ltd.
New Day Electric, Ltd.
Oldham & Son, Ltd.
Ottermill Switchgear, Ltd.
C. A. Parsons & Co., Ltd.
Pilkington Bros., Ltd.
Pirelli-General Cable Works, Ltd.
Premier Cooler & Engineering Co., Ltd.
Quasi-Arc, Ltd.
Radio Gramophone Development Co., Ltd.*
A. Reyrolle & Co., Ltd.
Richardsons Westgarth (Hartlepool), Ltd.
Rubery Owen & Co., Ltd.*
Sangamo Weston, Ltd.*
George H. Scholes & Co., Ltd.
Siemens Edison Swan, Ltd.
Simmonds & Stokes (Niphan), Ltd.
Simon-Carves, Ltd.
Simplex Electric Co., Ltd.*
W. Sisson & Co., Ltd.
Smiths Clocks & Watches, Ltd.*
Standard Telephones & Cables, Ltd.
Steatite & Porcelain Products, Ltd.
Sunvic Controls, Ltd.
Switchgear & Cowans, Ltd.
H. D. Symons & Co., Ltd.
Taylor, Tunnicliff & Co., Ltd.
John Thompson Water Tube Boilers, Ltd.
Tufnol, Ltd.
Unity Heating, Ltd.
Veritys, Ltd.
Wardle Engineering Co., Ltd.
Watford Electric & Manufacturing Co., Ltd.
Wego Condenser Co., Ltd.
G. & J. Weir, Ltd.
Westinghouse Brake & Signal Co., Ltd.
Whipp & Bourne, Ltd.
B. S. & W. Whiteley, Ltd.
Wild-Barfield Electric Furnaces, Ltd.
Worthington-Simpson, Ltd.
Yarrow & Co., Ltd.
Yorkshire Electric Transformer Co., Ltd.
Yorkshire Switchgear & Engineering Co., Ltd.

MANUFACTURING PROGRESS IN 1957

C. A. Parsons & Co., Ltd.

DURING last year the orders for turbo-alternators received by C. A. Parsons & Co., Ltd., included many large machines rated at up to 300 MW. Two machines of this size have been ordered by the Hydro-Electric Power Commission of Ontario for a new station to be built at Long Branch, near Toronto. These sets will be of the cross-compound type, and will take steam at 2,350 p.s.i. and 1,000 deg F with reheat to 1,000 deg F. The Commission has also ordered a fourth 200 MW set for the Richard L. Hearn generating station, Toronto. These four machines are also cross-compound, but will take steam at 1,800 p.s.i. and 1,000 deg F with reheat to 1,000 deg F.

A second 200 MW turbo-alternator has been ordered for the West Thurrock power station, and orders received for 120 MW machines include a fourth unit for Skelton Grange, two more for Drakelow " B " and a third machine for Kincardine. There are now thirteen sets of this size on order and under construction. These three-cylinder turbines are designed to operate with steam at 1,500 p.s.i. and 1,000 deg F with reheat to 1,000 deg F. These further machines of 100 MW output have been ordered for Aberthaw power station, making six sets of this output for this station. In addition, turbo-generators with outputs of 30, 25 and 20 MW have been ordered for South Africa, Canada and Mexico.

Among the large number of turbo-alternators which have been completed on site or commissioned during 1957 were a 100 MW set at Ferrybridge, and eight 60 MW and three 30 MW sets at various stations in this country.

In South Africa, Taaibos power station, containing eight 60 MW sets, was completed during the year. In Australia, 50 MW sets were installed at Lake Macquarie and Yallourn power stations, also 30 MW sets at Port Augusta, Osborne " B," Bunbury and Tennyson. A third 30 MW set was completed at Bulawayo, Southern Rhodesia, a 20 MW set at Trinidad, B.W.I., and a second 12·5 MW set at Baghdad.

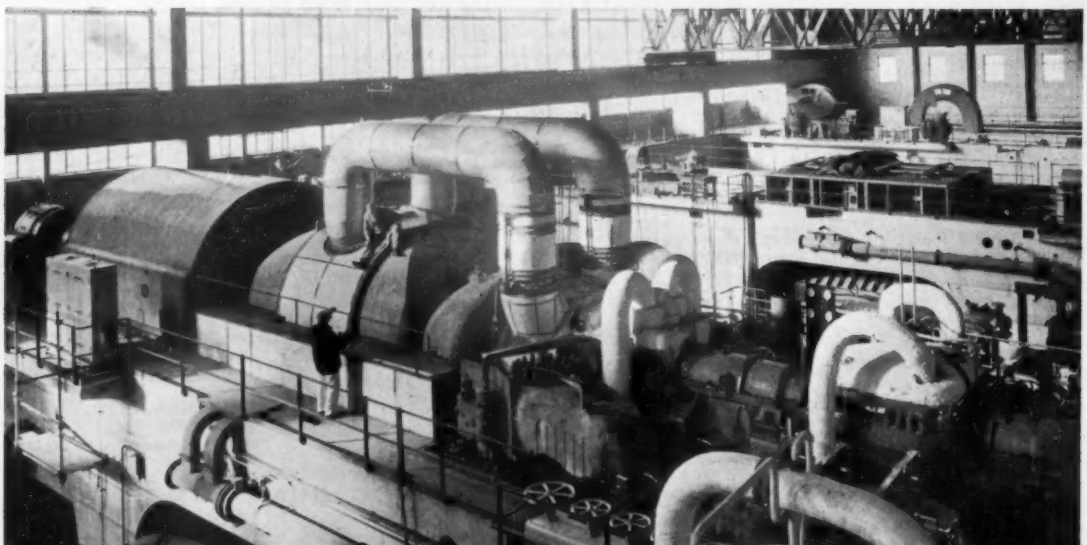
Large Turbo-Blower

At the beginning of 1957 a turbo-blower, believed to be the largest in the world, was commissioned at the Scunthorpe works of the Appleby-Frodingham Steel Co., its duty being to deliver free air at 160,000 cu ft/min at 35 p.s.i. It is designed to supply additional air to four separate furnace mains, individually supplied by four existing turbo-blowers.

Nuclear Power Plant

The company has now installed or has on order 740 MW of generating plant for nuclear power stations. These include eight 23 MW machines for Calder Hall " A " and " B," eight similar sets for Chapelcross and the latest order for Bradwell, which comprises six 52 MW main turbo-alternators and three 20·25 MW auxiliary sets. The company is also supplying all of the transformers for Bradwell. Each turbo-alternator will be directly connected to a 64 MVA, 11·8/141·6 kV, three-phase transformer with high-speed resistor type on-load tap-changing equipment on the h.v. side. Each transformer

The first of three 100 MW Parsons turbo-alternators nearing completion at Ferrybridge

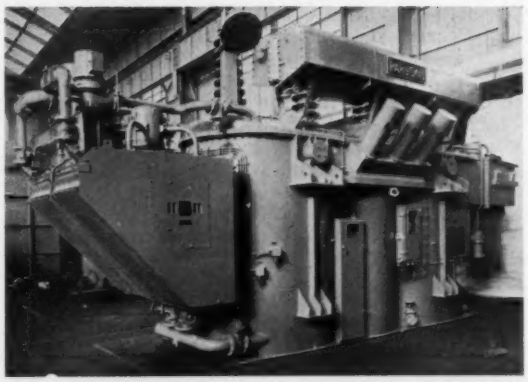


will be provided with two oil-water coolers, the pipework of which is arranged so that either oil pump may be used with either cooler.

A number of large generator transformers are being built for the 275 kV supergrid. These include a 210 MVA, 15/275 kV, three-phase transformer ordered by the Central Electricity Authority for the West Thurrock power station. Associated with this transformer are two station transformers rated at 22·5 MVA, naturally cooled, for operation at 275/7·1 kV. Another large transformer is a 106 MVA, 13·8/275 kV unit for Ferrybridge "B" power station.

Transformers under construction for export include two 75 MVA generator transformers for operation at 14·4/132 kV for the Boundary Dam generating station, Saskatchewan. These transformers will work in conjunction with the two 66 MW turbo-alternators also on order. Four single-phase units, each of 16,667 kVA, 132/26 kV, are under construction for export to Brazil, and a 50 MVA, 66/30 kV transformer for Caracas, Venezuela, with off-load tapping, air-blast cooling and gas cushion equipment in place of the more usual oil conservation.

The first of three 120 MVA units with a voltage range of 275/132 kV was for the C.E.A. at the Harker sub-station near Carlisle. It is a three-phase auto-transformer



Transportable 45 MVA 132/33 kV three-phase transformer

unit with on-load tap-changing gear. Another transformer delivered to the C.E.A. is the first of two 45 MVA 132/33 kV designed to be fully transportable spares. These transformers can be moved by road or rail from site to site as occasion demands with the minimum of delay.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Earthing and Insulating

MR. GILBERT'S recent articles reveal how unwise is the blind faith that is placed upon earthing, especially in domestic installations. The conditions necessary for a reliable earth path become daily more uncertain while the increasing use of electrical appliances calls for better and bigger earth paths.

The deterioration of earth connections is inevitable with time and if they fail they invariably do so without warning and at some unseen point. Safety by earthing often depends literally upon slender threads—a loose terminal, a broken wire or a little rusting. Fortuitous earths and resultant stray currents can cause disaster, yet ironically there have been fatalities because the "earth" has been good.

Each edition of the I.E.E. Wiring Regulations emphasises the belief in earthing yet it is patently obvious that the maintenance of a reliable earth is becoming almost impossible. Insulation, on the other hand, is such a major and fundamental part of electrical apparatus and wiring that it needs only a little extra care in design to produce a high degree of safety and reliability. Improved plastics and better ones certain to come in the future should encourage engineers and appliance designers to rely for safety upon better insulation.

Take, for example, the serious problem created by the rapidly increasing use of portable electric tools in the domestic field. Hedge trimming attachments are available which invite the user of a mains voltage tool to step from the comparative safety (but not remarkably safe) situation in the garage or outhouse into the much less safe conditions in the garden. The layman is unlikely to understand the proper requirements for earthing or the constant maintenance and vigilance necessary to ensure safety at all times. Even the professionals find it tricky and often disagree as to how it is best achieved.

I suggest therefore that the better alternative is to design portable tools with glass-fibre-plastic casing, or plastic-coated metal bodies and impregnated fibre or nylon gears. Already these methods have been employed in domestic appliances with success. A broken plastic case is a self-revealing danger, but a broken earth connection may never be revealed except by a fatality.

Shoreham, Sussex. H. HOBBINS, A.M.I.E.E.

Information on Insulation

THE most important development in the electrical industry, as evident to-day, will be the redesigning of the present electrical machinery to take full advantage of new developments in insulating materials in their bearing on space factor, high-temperature performance and up-rating. Statistical analysis methods are now in use for the accumulation, control and expression of insulating data. It is obvious that electrical insulation has assumed a role so important in the electrical industry that no single organisation can possibly cover all its fields without costly commitments.

In Germany the Zentralverband der Elektrotechnischen Industrie E.V. has a special organisation in Porz to deal with the electrical insulation industry. In the United States several organisations have split up this work sectionally to serve specific purposes.

The American Institute of Electrical Engineers' Committee on Dielectrics concentrates on all matters dealing

with the theory and practice associated with the applications of insulating materials to electrical machinery of all descriptions. The American Society for Testing Materials' Committee D-9 develops standard test methods and specifications for insulating materials. The National Academy of Sciences, through its National Research Council on Insulations, brings together eminent physicists, chemists and engineers to promote and stimulate the advance of knowledge in this field. The Chemical Society deals with electrical and chemical aspects of electrical insulation. The Society of Plastic Engineers confines its activities to promulgating information on resins for application to the electrical industry.

Apart from this the technical Press in Germany and the United States, in co-operation wtih industry, have been devoting considerable space to the latest features and developments, although many ideas originated in this country.

Under prevailing conditions no engineer or scientist associated with the electrical industry can effectively follow all these new developments unless he can devote his whole time to it. More progressive electrical manufacturers, however, employing technical and scientific staffs, have now a policy of encouraging the preparation of technical and research material for their staff to improve their products. This helps the designer of electrical equipment, who has now a bewildering range of new synthetic materials to choose from, in determining the best insulation system for a particular application. But what about the smaller electrical manufacturer, who may naturally ask if a new material will stand up to the purpose for which it is designed more economically and with longer life.

To effectively answer that question he must depend upon some central non-profit-making organisation, working in co-operation with the technical Press, to diffuse knowledge on all the latest developments in the field of electrical insulation. No undue risks can be taken in accepting unproved insulating materials for any equipment, whatever the merits stated by their manufacturers.

London, S.W.19. ARTHUR R. NISSER, D.I.C.

N.I.C. Membership and Tenders

I HAVE read the letter from Mr. John R. Seager in your issue of 13th December and would like to take up strongly his insinuation that the National Inspection Council is a "closed shop." Enrolment with the Council is open to every electrical installation contractor, large or small, who conforms to the required standards, which are those set out in the I.E.E. Wiring Regulations thirteenth Edition. The annual subscription is three guineas, and even this is allowable as an "expense" for rebate of income tax. The National Inspection Council is an "open shop" and is only too willing to welcome all reputable contractors on to its Roll.

Incidentally, in your editorial comment under "Towards Safer Installations" (22nd November) you hardly went as far as to imply that non-membership of the N.I.C. should exclude firms from tendering in the open market. What you did say was that the N.I.C. is trying to foster interest among those local housing authorities which allot contracts to the lowest tenderer *irrespective of the standard of work.* Surely that is an object with which no one can quarrel.

London, S.W.1. W. G. S. THOMPSON,
Chief Executive and Secretary,
N.I.C. for Electrical Installation Contracting.

Report on Colliery Explosion

FOUR men were killed at Chanters Colliery, near Atherton, Lancs., in March last year. Two of them were electricians working on a haulage-gear electrical control panel in which a fault had been reported. Four others died later; three badly-burned men survived.

Reporting on the accident, Mr. G. Hoyle, divisional inspector of mines, states that the explosion was caused by an electric arc which was formed during an examination of the working of a switch to which power was still connected, when the top cover of the switch was twisted around and came into contact with a live busbar, in the presence of a body of inflammable gas.

While the failure to detect the body of gas concerned in the explosion might be looked upon as caused by lack of imagination and the casual nature of the inspections made, the part played by the electricians was more reprehensible. The busbar chamber was still alive when they worked on it, although a regulation required them to make it dead and the words "Warning: Isolate supply elsewhere before removing cover" were cast on top of the very cover they loosened and twisted around. The isolating switch which would have made the busbar chamber dead was only ninety yards away.

Mr. Hoyle says: "The majority of electrical accidents occur when men work on exposed live apparatus either deliberately or accidentally and the high number of accidents indicates the prevalence of these dangerous practices. If gas is present the risks are vastly increased. An improvement in the conduct of some electricians is urgently needed. There is no need to provide more regulations—if the present ones were carried out the number of accidents would undoubtedly fall. What is required on the part of some electricians is a greater sense of responsibility. Comparatively recent legislation, by requiring electricians to have higher qualifications, should be a stimulus towards this end. Indeed, any step in that direction, for instance the joining of a professional society, would be advantageous. In my opinion it is for electricians themselves, by their own efforts, to eradicate the type of conduct which led to the present disaster."

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton	£197 0s 0d
COPPER, H.C. Electro	ton	£179 5s 0d
Fire Refined 99·70%	ton	£178 0s 0d
Fire Refined 99·50%	ton	£177 0s 0d
COPPER Tubes	lb	1s 8½d
Sheet	ton	£205 10s 0d
H.C. wire and strip	ton	£227 15s 0d
LEAD, English	ton	£71 15s 0d
Foreign	ton	£70 0s 0d
MERCURY	flask	£69 0s 0d
TIN, block (English)	ton	£730 5s 0d
ZINC, G.O.B. Foreign	ton	£61 10s 0d
Electrolytic	ton	—
BRASS Tubes (solid drawn)	lb	1s 5½d
Sheet	ton	—
Wire	lb	2s 3d
PHOSPHOR BRONZE Wire	lb	3s 6½d
PLATINUM	oz	£28 10s 0d
RUBBER, No. 1 R.S.S. spot	lb	23¼d—24d

VIEWS on the NEWS

By REFLECTOR

LAST week I referred to replies by Mr. A. R. Cooper, the controller of the North West, Merseyside and North Wales Division, to questions put to him through the Division's magazine—"presumably for the last time as divisional controller." Mr. Cooper has now been translated to the directorship of the Eastern, London and South Eastern Region of the Central Electricity Generating Board. I am interested to see that in his new sphere Mr. Cooper intends to continue this question and answer arrangement through a new magazine "Regional Power." He admits that the idea originated with the Detroit Edison Co. of America and says:—

> "This is not a new idea for short-circuiting your boss, for in every case the question and the reply will go to the station superintendent, section head or divisional controller before it reaches the questioner, but it will provide a simple and authoritative way of killing rumours and of obtaining information which might be helpful to the individual."

* * *

Power from nuclear fusion is nearer than is generally thought if we are to believe the Scientific Correspondent of the *Financial Times*. In a forecast of likely scientific discoveries during 1958 he says:—

> "Nuclear Power: Dounreay and Calder Hall II will start operation. Harnessing of H-bomb power for industry—U.K., U.S. and U.S.S.R. . . ."

* * *

Fly ash from pulverised-fuel-fired boilers has been an embarrassment to the Central Electricity Authority but of recent years some of it has been disposed of for the composition of building aggregates—and has actually been paid for. But there is still a surplus and hitherto it has seemed that it can only be dumped in unsightly heaps or spread around to form a wilderness. Now, however, it has been discovered that it has possible agricultural uses. At the Meaford (Staffs.) power station the Botanical Department of Birmingham University has been conducting experiments which have shown that it is possible to cultivate clover on the untreated ash. From a report which appears in the *Staffordshire Advertiser* it seems that we must not be too optimistic yet, but if it is found that it is possible to grow other crops on the ash a troublesome problem will be on the way to solution.

* * *

I have come across several instances of small chapels which have fallen into disuse being converted into sub-stations, but I think that a Scottish case represents the first conversion of a full-sized church for the purpose. The *Edinburgh Evening News* recently published a picture of Holy Trinity Church, Dean Bridge, Edinburgh, a hundred-year-old building which has been purchased from the Scottish Episcopal Church authorities. Most of the church furnishings have gone to other churches and the interior will be cleared for the housing of transformers. The exterior of the building is not to be altered.

* * *

Two typists' errors recorded in the *Henley Telegraph* are worth noting. The first given the phrase:—"Half-hour tests are unreliable" turned it into "Half our tests are unreliable." The other (or was it the same?) produced ". . . in order to cover the whole test cycle we have arranged for two men to work in night shirts."

* * *

There seems to have been some misinterpretation by the *Evening Sentinel* (Hanley) of a lecture recently delivered by Mr. G. T. Shepherd of the C.E.A.'s Atomic Energy Department, at a meeting of the Stoke-on-Trent Association of Engineers. This journal says:—

> "Atomic power stations are at present less economical to operate than conventional power stations in coal producing areas, where coal is cheap. But in areas where no coal is produced—such as the South of England—nuclear stations already supply power more cheaply than coal-burning stations, despite their huge capital cost."

Apart from the fact that there *is* coal in the South of England, it seems strange that a newspaper should believe that there are already nuclear stations in operation in that area.

* * *

It was about 34 years ago that Miss (later Dame) Caroline Haslett started the Electrical Association for Women, but there might have been such a body 36 years earlier. In the *Electrical Review* of 13th January, 1888, there appeared a report of a class for ladies formed by Mrs. Hertha Ayrton (the first woman member of the I.E.E.) in the following terms:—

> "Lectures by a lady to ladies on electricity are certainly a novel means of disseminating information regarding bells, batteries, and dynamos; but there is no reason why a great measure of success should not be attained in this direction. With the spread of definite knowledge amongst the fair sex of the advantages and beauties of electrical appliances, electric light, and electrical methods of doing household and other work, we are sure to find an increased demand upon the services of the electrician and electrical engineer (either or both, if there be any distinction between them). Interest the ladies, therefore, in electrical matters, and they will give an adequate return by agitating for a more general adoption of electricity for light and for work. We are glad to see that so competent a lady as Mrs. Ayrton is taking the initiative in this commendable movement."

Generating Board Appointments

THE Central Electricity Generating Board has announced the following appointments:—

Mr. D. P. Sayers, B.Sc., M.I.Mech.E., M.I.E.E., M.Amer. I.E.E., chief contracts officer of the Board, has been appointed chief commercial and operations engineer. After some years with Kennedy & Donkin on Central Electricity Board work and constructional work for the Northern Ireland scheme, Mr. Sayers became assistant engineer in the Sheffield Electricity Department. In 1943 he went to Birmingham as deputy chief engineer and manager of the city electricity undertaking. On nationalisation he became chief engineer of the Midlands Electricity Board and then was appointed deputy chief engineer (transmission) of the British Electricity Authority. In 1954 he returned to the Midlands Board as deputy chairman and three years later took up his present duties.

Mr. E. S. Booth, M.Eng., M.I.Mech.E., M.I.E.E., deputy chief engineer (design and construction) of the Board, becomes chief design and construction engineer. He received his training with the Metropolitan-Vickers Electrical Co., Ltd., later joining the staff of the Yorkshire Electric Power Co. as construction engineer. In 1947, after serving a year as deputy, he became city electrical engineer and manager at Salford. On the reorganisation of the electricity supply industry in 1948 he was appointed generation construction engineer of the North Western Division of the British Electricity Authority and two years later joined the headquarters staff as co-ordination engineer (construction), subsequently becoming generating station construction engineer. In 1957 he took up his present duties.

Mr. J. L. Ashworth, A.M.I.Mech.E., A.M.I.E.E., deputy divisional controller of the North West, Merseyside and North Wales Division, is appointed deputy regional director of the North West, Merseyside and North Wales Region. After holding various positions with the Metropolitan-Vickers Electrical Co., Ltd., he joined the Manchester Corporation at the Stuart Street power station and later served with the Hull Corporation Electricity Department. He then went to the Halifax Corporation as maintenance engineer and later joined the Mersey Power Co., Ltd., as engineer in charge of its plant construction, subsequently becoming generation engineer of the company. In 1948 he was appointed chief generation engineer (operation) of the North Western Division of the B.E.A., and when that Division amalgamated with the Merseyside and North Wales Division in 1954 was appointed chief generation engineer (operation) of the new Division. Last year he became deputy divisional controller.

Mr. W. H. Dunkley, B.Sc., M.I.Mech.E., M.I.E.E., chief generation engineer (operation) of the Yorkshire Division, becomes controller of the South Eastern Division. He served an apprenticeship with the English Electric Co., Ltd., and then joined the Dundee Electricity Department in 1926, two years later going to Shanghai as assistant charge engineer of the Riverside power station, afterwards serving in the Chief Engineer's Department. He returned to England in 1934 to join the Central Electricity Board as operation superintendent for S.W. England and South Wales. Three years later he joined the Hull Corporation Electricity Department where he became deputy general manager. In 1948 he was appointed chief generation engineer (construction) of the Yorkshire Division of the British Electricity Authority.

Mr. A. R. Clague, M.Eng., A.M.I.Mech.E., A.M.I.E.E., chief generation engineer (operation) of the South Eastern Division, is appointed controller of the South Western Division. He served his apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd., where he subsequently worked as a mechanical draughtsman and then as a mechanical engineer. After nine years with the Belfast Corporation Electricity Department as assistant technical engineer and later assistant power station superintendent he went in 1944 to the West Midlands Joint Electricity Authority, first as assistant generation engineer and then as generation engineer. In 1948 he was appointed generation engineer (operation) in the B.E.A. Midlands Division and took up his present post five years later.

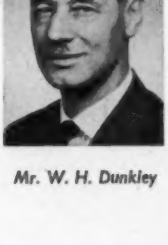
Mr. W. Wilde, B.Sc.(Eng.), A.M.I.Mech.E., A.M.I.E.E., M.Inst.F., chief generation engineer (operation) of the London Division of the Board, is appointed controller of the South Wales Division. Joining the Sheffield Corporation Electricity Department, he occupied several engineering positions at Neepsend and Blackburn Meadows power stations. These were succeeded by a period in the stations of the Newcastle-on-Tyne Electric Supply Co., and then he joined the Lancaster Corporation as a charge engineer. In 1926 he was appointed combustion engineer at the Deptford East power station and subsequently became station superintendent there. In 1948 he was appointed generation engineer (operation) of Group 11 of the London Division's power stations and three years later took up his present duties.

Mr. C. G. Richards, M.Sc.Tech., A.M.I.Mech.E., A.M.I.E.E., chief generation engineer (operation) of the Yorkshire Division, has been appointed controller of that Division. After a college apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd., Mr. Richards joined the outside erection staff of the company in 1928. He was employed by the Singapore Municipality from 1931 to 1945 (including internment there during the Japanese occupation), first as power station engineer and then as distribution engineer. In 1946 he was appointed generation engineer in the

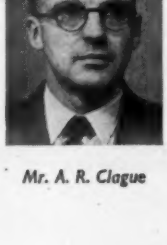
Mr. D. P. Sayers

Mr. E. S. Booth

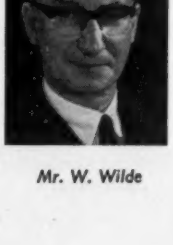
Mr. J. L. Ashworth



Mr. W. H. Dunkley



Mr. A. R. Clague



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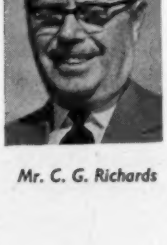

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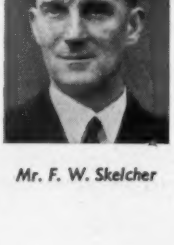
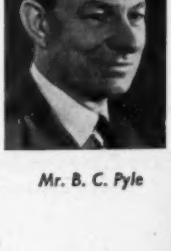


Mr. F. W. Skelcher



Mr. B. C. Pyle

PERSONAL AND SOCIAL

News of Men and Women of the Industry

New Year Honours.—In our last issue we published the names of some of the electrical men who were included in the New Year Honours List. In addition to those already mentioned awards have been made to the following:—

Among the new Officers of the Order of the British Empire (O.B.E.) are **Mr. W. G. N. Chew,** M.I.E.E., staff engineer, Deputy Director of Signals (Landlines), Air Ministry; **Mr. R. Dell,** M.I.E.E., signal engineer, London Transport Executive; and **Mr. G. B. Mansell,** chairman and managing director, Poselco, Ltd. The O.B.E. (Military Division) is awarded to **Wing Commander A. G. Mason,** R.A.F.V.R., a director of Alfred G. Mason & Collins, Ltd., electrical wholesalers.

Mr. G. B. Mansell

Additional names in the list of Members of the Order (M.B.E.) are **Mr. W. L. Bower,** chief designer, James Neill & Co. (Sheffield), Ltd.; **Mr. F. M. Evans,** B.Sc., chief designer, C.A.V., Ltd.; **Mr. G. McG. Perry,** assistant manager, Electrical Department, Harland & Wolff, Ltd., Belfast; and **Mr. J. E. Thwaites,** lately senior executive engineer, G.P.O.

The British Empire Medal (B.E.M.) has been awarded to **Mr. G. Cook,** chargehand fitter (electrical), Central Electricity Authority, North Eastern Division (York); **Mr. F. Farnsworth,** leading driver, steam turbine, C.E.A., East Midlands Division (Kettering); **Mr. W. O. Handy,** leading stoker, Stourport "B" power station, C.E.A., Midlands Division; **Mr. C. G. Jones,** turbine blader chargehand, W. H. Allen, Sons & Co., Ltd., Bedford; **Mr. H. Jones,** foreman electrician, Harland & Wolff, Ltd., Liverpool; **Mr. S. Oliver,** chargehand overhead linesman, North Western Electricity Board (Whaley Bridge); and **Mr. B. T. Walker,** tool maker, Thomas Bolton & Sons, Ltd., Stoke-on-Trent.

Lord Citrine has been appointed a part-time member of the United Kingdom Atomic Energy Authority in succession to Sir Luke Fawcett. The appointment will normally terminate on 31st December, 1960. As our readers will know, Lord Citrine was chairman of the Central Electricity Authority, which was dissolved at the end of last year, and he is a part-time member of the new Electricity Council.

Mr. S. Hale and **Dr. A. B. Whitworth,** Ph.D.(Chem.), B.Sc., have joined the board of the A.E.I. Lamp & Lighting Co., Ltd. Mr. Hale has been appointed director in charge of lamp manufacture and Dr. Whitworth becomes technical director. Their offices are now at the new headquarters building of the company at Melton Road, Leicester.

Mr. Hale served his electrical engineering apprenticeship with the Ebbw Vale Steel, Iron & Coal Co. where he held the post of chief electrical engineer from 1926 to 1936. He joined the Edison Swan Electric Co., Ltd., at its lamp factory at Ponders End in 1936 and was appointed assistant manager for the whole of the Ponder End works in 1945, becoming general works manager in 1947. When the Edison Swan lamp factories were transferred to the B.T.H. Co. in 1955 Mr. Hale joined the staff of the B.T.H. as lamp production manager and in 1956 was appointed general manager of the lamp factories.

Dr. Whitworth trained as a technical chemist at the Royal Technical College, Glasgow, and joined the B.T.H. Co. as a chemist in the lamp works at Rugby in 1923. He was appointed technical assistant to the lamp works manager in 1938, head of the Lamp Engineering Department in 1950 and manager in 1956.

Mr. S. Hale

Dr. A. B. Whitworth

Mr. W. Hucker, secretarial officer and former information officer of the South Western Electricity Board, has been appointed group publicity manager for the Lancashire Dynamo Group at St. Stephen's House, Westminster, S.W.1. Mr. Hucker was for several years industrial correspondent of the *Bristol Evening Post* before he was appointed the South Western Board's information officer in 1951.

Sir Thomas Spencer has relinquished his position as managing director of Standard Telephones & Cables, Ltd., and he is succeeded by **Mr. F. C. Wright.** Sir Thomas continues as chairman of the company and its subsidiaries.

Mr. Wright, who is fifty-three, joined Standard Telephones & Cables in 1925 and has held important technical and engineering appointments within the company. He has been assistant managing director since July,

Sir Thomas Spencer

Mr. F. C. Wright

Generating Board Appointments (cont.)

Sheffield Corporation Electricity Department and on the reorganisation of the industry became chief generation engineer (operation) in the Yorkshire Division of the B.E.A., holding this position to the present date.

Mr. F. W. Skelcher, M.I.Mech.E., M.I.E.E., deputy chief engineer (generation and system operation) of the Board, is to be controller of the Midlands Division. Mr. Skelcher took up his first appointment with the Birmingham Electric Supply Department in 1928. He served the Department for twenty years, finally becoming deputy generating stations engineer. In 1948 he was appointed generation engineer (operation) of the southern group of power stations of the Midlands Division of the B.E.A. and two years later became chief generation engineer (operation) of the same Division. In July of last year he took up his present duties.

Mr. B. C. Pyle, M.I.E.E., chief generation engineer (construction) of the Southern Division, becomes chief assistant project engineer to the Northern Project Office. He received his technical education at Portsmouth Municipal College and was a student engineer with the Portsmouth Electricity Department. He then served with the Sheffield Corporation Electricity Department as junior technical assistant, returning to Portsmouth as technical assistant (electrical). With the reorganisation of the industry in 1948, Mr. Pyle became personal assistant to the controller of the Southern Division, and a year afterwards was appointed senior assistant engineer (construction). He took up his present duties in 1953.

1956. He is also a director of Standard Telephones & Cables Manufacturing Co. (Canada), Ltd., Kolster Brandes, Ltd., and Standard Telecommunication Laboratories, Ltd.

Mr. Antony Head, M.P., formerly Minister of Defence, has been elected a director of Associated Electrical Industries, Ltd.

Mr. C. C. Hill, B.Sc.(Eng.), M.I.E.E., M.I.Mech.E., manager of the Northmet Sub-Area of the Eastern Electricity Board since 1948, has been appointed chief engineer of the Board in succession to Mr. G. N. Green, who was recently appointed deputy chairman of the North Eastern Electricity Board.

Mr. C. C. Hill

Mr. Hill received his technical training at the Brighton Technical College, and from 1924 to 1926 was a college apprentice with the Metropolitan-Vickers Electrical Co., Ltd., with which company he gained experience as an erection engineer in London and Newcastle. In 1929 he joined the Brighton Corporation electricity undertaking where he became successively technical assistant, assistant manager, and deputy engineer and manager. In 1945 he was appointed assistant general manager of the Northmet Power Company, a position which he retained until the nationalisation of the electricity supply industry.

Mr. L. H. Burton, manager of the Contract Department of Johnson & Phillips, Ltd., retired on 31st December after forty-four years' service with the company.

Mr. Burton commenced his association with the J. & P. Contract Department in 1913. The next year he became engineer-in-charge of all contracts in the London and Home Counties area, and in 1918 joined the head office staff of the Contract Department as chief estimating engineer, becoming manager of the department in 1941. Mr. Burton was educated at George Watson's College and received his technical training at the Heriot-Watt College, Edinburgh, and the Manchester School of Technology. His practical training was gained with Bruce Peebles & Co., Ltd., Edinburgh, and the Lancashire Dynamo & Motor Co., Ltd., Manchester. On completion of his training he was with John Brown & Co., Ltd., Clydebank, for some time.

Mr. E. F. Ward, who has been the company's assistant contract manager since 1953, has been appointed to succeed Mr. Burton as manager of the department. Mr. Ward joined J. & P. in 1923 and has been actively concerned with many large electrification contracts, both at home and abroad, particularly in the oil, metallurgical and sugar industries. He received his technical training at Rutherford Technical College, Newcastle-on-Tyne, and served his apprenticeship with J. H. Holmes & Co.

Johnson & Phillips, Ltd., also announce a further appointment in the Contract Department, **Mr. J. Bentley,** B.Eng., A.M.I.E.E., becoming chief engineer, construction.

Mr. Bentley joined J. & P. in 1926 as a graduate apprentice direct from Liverpool University and two years later became a contract engineer handling overhead line contracts in North Wales. Among the many schemes he was responsible for in the ensuing years were the Isle of Man electrification scheme and various 132 kV transmission lines for the C.E.B. During the war he handled many contracts in dockyards and shipbuilding yards in Scotland, and in 1946 came south for the cable laying contract for the Liverpool Street to Shenfield railway electrification scheme. Since then he has been engineer-in-charge of all contracts in the London and Home Counties area.

Three new appointments in the J. & P. sales organisation are announced. **Mr. R. L. Stanley,** D.F.H., A.M.I.E.E., previously manager of the Glasgow branch, has been appointed transformer sales engineer for the home market. Mr. Stanley is well known in Scotland, where, until this appointment, he was hon. secretary of the S.W. Scotland Sub-Centre of the I.E.E. He joined J. & P. in 1947 after war service with the R.N.V.R. (Electrical Branch).

Mr. Stanley is succeeded as manager of the Glasgow branch by **Mr. D. W. Gregory,** D.F.H., A.M.I.E.E. After practical training at the J. & P. works, Mr. Gregory joined the Edinburgh sales staff in 1949 and was made assistant manager of the Edinburgh branch in 1954.

Mr. J. T. Easter, previously sales engineer at Edinburgh, becomes Edinburgh branch manager. Mr. Easter received his technical education at the Borough Technical College and his practical training at J. & P. From 1954 to 1957 he was hon. secretary and treasurer of the Lothians Branch of the A.M.E.M.E., and this year he has been elected vice-president of the Branch. The Edinburgh and Glasgow branches remain under the supervision of Bailie B. Russell, M.I.E.E., the company's engineer and manager for Scotland.

An award under the Royal Society and Nuffield Foundation Commonwealth Bursaries Scheme has been made to **Mr. C. St. J. Lamb,** lecturer in electrical engineering, New South Wales University of Technology, to enable him to assist in the development of instrumentation of nuclear reactors at Erith, Kent, for a year.

Colleagues in the Industrial Machines Department of the British Thomson-Houston Co., Ltd., bade farewell on 31st December to **Mr. N. Laycock,** who has retired after forty-five years' service with the company. A presentation was made to him by Mr. R. G. A. Dimmick, manager, industrial machines, on behalf of friends and colleagues.

Mr. N. Laycock

Mr. Laycock joined the B.T.H. Co. in 1912. After three years in the Test Department he went, in 1916, to the Coventry Works to supervise the manufacture of aircraft magnetos. Returning to Rugby in 1917, he was engaged in various activities until 1928 and then spent five years at the Leeds district office as a technical and commercial engineer. He went back to Rugby in 1934, joining the Industrial Sales Department (now Industrial Machines) where he remained until his retirement.

During a recent visit to Nigeria, **Sir Gordon Radley,** director-general of the British Post Office, visited a number of sites of the extensive tele-

Mr. L. H. Burton

Mr. E. F. Ward

Mr. J. Bentley

Mr. R. L. Stanley

Mr. D. W. Gregory

Mr. J. T. Easter

Sir Gordon Radley (left) inspecting Marconi equipment at Ipara, Nigeria

communications scheme which is being constructed and maintained by Marconi's Wireless Telegraph Company for the Nigerian Posts and Telegraphs Department. The network will eventually be operated by Nigerian engineers who are at present attending a specialised training course under Marconi instructors at a specially constructed extension to the Posts and Telegraphs School at Oshodi.

The accompanying picture shows Sir Gordon Radley and Mr. G. Seear, controller of Marconi's Nigerian v.h.f. maintenance service, in the radio room of the repeater station at Ipara.

Mr. H. Nuttall, M.I.E.E., A.M.I. Mech.E., A.M.Am.I.E.E., has been appointed managing director of the English Electric Co. of New Zealand, Ltd. Mr. Nuttall, who will take up his new post in Wellington at the end of January, was educated at Queen Elizabeth's Grammar School and the Manchester College of Technology. He was awarded the West Prize as the best student of his year in mechanical engineering. He served a student apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd., at Trafford Park, and in 1939 he joined the North Eastern Electric Supply Co. as a senior assistant engineer. In the last war he served first in the Mechanical Engineering Branch of the R.A.O.C. and later with the Indian Army (I.E.M.E.), attaining the rank of major.

Mr. H. Nuttall

Mr. Nuttall joined the staff of Binny & Co., Ltd., in Madras in 1947, becoming their chief engineer, and he was chiefly responsible for supervising contracts placed with the English Electric Co. for all types of heavy plant purchased for South India's development projects. He returned to the United Kingdom in 1952 to work in the English Electric Co.'s Export Department, and in that field has been Eastern Area export manager covering India, Pakistan, Burma and Ceylon up to the time of his present appointment.

Mr. E. J. Shuter, London sales manager of Claude-General Neon Lights, Ltd., retired on 31st December. He has been associated with electric signs since he joined the staff of the G.E.C. in 1927. He transferred to the sales staff of Claudgen soon after its formation in 1931 and was appointed sales manager in 1938. During the last war he rejoined the G.E.C. and, after working in its Business Development Department, returned to Claudgen in 1955 as London sales manager. He was chairman of the Electrical Trades' Commercial Travellers' Association in 1954.

Mr. H. R. Whyte, A.M.I.E.E., who has been on the board of Hellermann, Ltd., for several years, has been appointed technical director, and **Mr. C. E. D. Catley** has joined the board as works director. The following appointments have also been made:—Manager of the cable accessories division, **Mr. S. E. Downer;** manager of the plastic extrusions division, **Mr. P. Steer;** assistant sales manager, **Mr. P. Bowthorpe.**

Mr. O. D. Angell has been elected chairman of the British Vacuum Cleaner and Engineering Co., Ltd.

Dr. W. R. C. Coode-Adams, who until recently was principal of Faraday House, informs us that he is taking up the position of principal of the Technical College, Patiala, India.

Mr. F. A. Geary, M.I.E.E., manager of the South Western District of the London Electricity Board, is retiring on 9th February after over forty-seven years in the electricity supply industry.

Mr. Geary was educated at Regent Street Polytechnic Technical Day School, and was apprenticed to a switchgear manufacturer. He entered the supply industry in 1909 with the North Metropolitan Electric Supply Co. (later Northmet Power Co.). In 1911 he was appointed engineer-in-charge at the power station of the South London Electric Supply Corporation, and after service in the 1914-18 war with the Royal Engineers was appointed (in 1921) assistant distribution engineer, and subsequently distribution engineer, to the South London Electric Supply Corporation. On the formation of area control by the County of London group he was appointed area engineer of the South West area and on nationalisation of the industry was appointed as a senior technical officer, Design and Planning Branch, Chief Engineer's Headquarters. He became district manager of the newly formed South Western District (Wandsworth, Battersea and Barnes) of the London Electricity Board in 1953. Mr. Geary was joint author of a paper read before the Institution of Electrical Engineers in 1943 on "Maintenance of Distribution Plant and Mains on A.C. Networks."

Mr. G. Parry has been appointed general sales manager of the General Cable Manufacturing Co., Ltd., and Britannic Cables, Ltd. He received his early training with W. T. Henley's Telegraph Works Co., Ltd., and continued with that company until 1950 when he joined the General Cable Manufacturing Co., becoming sales manager in 1951.

Mr. G. Parry

Mr. F. J. T. Holland, a joint managing director of Blaw Knox, Ltd., retired from the board on 31st December after 37 years' service. He is succeeded by **Mr. A. E. Percivall,** who was appointed managing director, Transmission Tower Division, on 2nd January.

The annual general meeting of the **E.I.B.A. Manchester and District Branch** will be held on 28th January at 5.30 p.m., at the Engineers' Club, Albert Square, Manchester.

The Tyne and Wear Area of the E.I.B.A. is holding its annual meeting on 16th January (3 p.m.) in the Lecture Theatre, Carliol House, Newcastle-upon-Tyne, 1, under the chairmanship of Mr. R. Hawes Davison.

The tenth annual ball, organised by the Manchester Branch of the E.I.B.A. was held on 6th December at

Mr. H. Cobden Turner (chairman of the Ball Committee), and Mr. and Mrs. J. S. Pickles at the E.I.B.A. Manchester ball

the Midland Hotel, Manchester. Mr. J. S. Pickles, the president, and Mrs. J. S. Pickles attended the function, which raised £1,200 for the E.I.B.A. funds.

British Insulated Callender's Cables, Ltd., announce the appointment of **Mr. A. F. Miller** as branch manager of the Aberdeen branch office, and **Mr. L. R. Cleworth,** A.M.I.E.E., as branch manager of the Newcastle branch office.

Mr. Miller joined the former Callender's Cable & Construction Co. in 1938 as sales representative in the

Mr. A. F. Miller

Mr. L. R. Cleworth

Edinburgh office. He was educated at Leith Academy and at Heriot-Watt College, Edinburgh.

Mr. Cleworth served an engineering apprenticeship with British Insulated Cables, Ltd., and studied mechanical and electrical engineering at the St. Helens Municipal Technical College. After being engaged in the design and layout of overhead transmission lines, substations, and busbar and cable installations, he became a contracts estimating engineer in 1936. In 1947 he was appointed deputy estimating manager at Prescot and in 1955 he transferred to the sales organisation.

Crofts Engineers (Holdings), Ltd., announces the appointment of **Mr. J. Midgley** as managing director of its subsidiary company, Carter Gears, Ltd. Mr. Midgley, who became a director a year ago, joined the company in 1947 as chief draughtsman and he has held the position of general manager since October, 1952.

Mr. C. Collaro, O.B.E., and **Mr. A. W. M. Hartley** have joined the board of Camp Bird, Ltd., the parent company of the Camp Bird Group. Mr. Collaro founded Collaro, Ltd., in 1919, and recently resigned as chairman and managing director, before joining the Group as chairman of Camp Bird Industries, Ltd.

Mr. Hartley founded Hartley Electromotives, Ltd., in 1937, and this subsequently expanded into the present Hartley Baird Group, which recently came under the control of Camp Bird. Mr. Hartley remains managing director of Hartley Baird.

Mr. E. Wilson has been appointed general sales manager to Camp Bird Industries, Ltd. He was formerly with Thorn Electrical Industries, Ltd., first as commercial manager of the "Atlas" lighting division, and latterly as general manager of the domestic appliances division.

The annual dinner of the Manchester branch of the **Reliance Telephone Co., Ltd.,** was held at the Mersey Hotel, Manchester, recently. The chair was taken by Mr. A. Bailey, the Manchester branch manager, and 140 members of the staff and their friends were present.

The 25th Christmas party and dance of **R. B. Pullin & Co., Ltd.,** was held at the Hammersmith Town Hall recently. Over 620 employees and friends were the guests of the directors. Music was provided by Tommy de Rosa and his orchestra and there was a spectacular cabaret and floor show.

More than fifty prizes of Christmas fare were presented by the chairman, Mr. R. B. Pullin, O.B.E., and the managing director, Mr. Philip J. Ellis, O.B.E.

OBITUARY

Mr. William Hawthorne, B.A., B.E., M.I.C.E., M.I.E.E., of Elstan, Orchard Way, Esher, Surrey, died on 29th December at the age of seventy-nine. Mr. Hawthorne graduated at Queen's College, Belfast, and in 1903 joined the firm of Chas. H. Merz, consulting engineer, of Newcastle-upon-Tyne, which later became Merz & McLellan, and with whom he remained for fifty-three years. His activities during this time were concerned with the electrification of railways, the layout of transmission lines and the construction of power stations, both thermal and hydro-electric, his work taking him to Sweden, Holland, Belgium, Germany, France, Switzerland, South Africa, Argentina and Brazil.

Mr. L. F. Brookman.—The death occurred suddenly on 18th December, at the age of 73, of Mr. L. F. Brookman, director of Ross Courtney & Co., Ltd., since 1923. Mr. Brookman was the son of Mr. L. Broekman who financed the business begun under the partnership of Ross & Courtney in 1889. The young Mr. Broekman (who changed his name to Brookman) became apprenticed to Ross Courtney at the beginning of the century and joined the board in 1923.

When Ross Courtney & Co. became a member of the Southern Areas Electric Corporation group Mr. Brookman remained a director and was actively interested in the company's affairs until he recently entered hospital for an operation. He was a committee member of the London and District Association of the Engineering and Allied Employers' National Federation.

Mr. Harold Allwood, A.M.I.E.E., founder and director of Dacier, Ltd., died on Christmas morning at the age of seventy-four. He was apprenticed to the British Thomson-Houston Co. at Rugby and joined the British Insulated Cables Co., Prescot, in 1903. He moved to London in 1913 where, until 1920, he was a designer with the Hackbridge & Hewittic Electric Co. In that year he decided to start his own business, and he secured an agency in this country for Jaroslaw's Erste Glimmerwarenfabrik in Berlin, then well known in the electrical insulation field. In partnership with the late Mr. H. Watson Humphries, and with the participation of Jaroslaw's, Dacier, Ltd., was registered in December, 1920, and it has been closely connected with the mica industry. Mr. Allwood remained active in the business until the last year of his life. The business remains in the family.

Mr. E. A. Reid.—We have just learned of the death of Mr. Ernest A. Reid, president of Ernest Reid, S.A., engineers and manufacturers' representatives, which occurred on 2nd November in Lima. Mr. Reid was born in Callao, Peru, but spent his student days in Great Britain, serving as a student apprentice with Dick, Kerr & Co. (now the English Electric Co.). He returned to Peru and after some years there came back to this country where he was for many years on the staff of the Canadian & General Finance Co., Ltd., a subsidiary of the Brazilian Light & Power Co. During the last war he lived at Hove, Sussex, and he returned to Peru in 1949.

Sir Andrew Clow.—The death has occurred of Sir Andrew Gourlay Clow, who was chairman of the Scottish Gas Board from 1949 until his retirement in 1956. He was 67. Sir Andrew, a native of Aberdeen, entered the Indian Civil Service in 1914. He had a distinguished career in India, and from 1942 to 1947 was Governor of Assam. He was chairman of the committee set up in 1948 by the Ministry of Fuel and Power to investigate the practicability of reducing electricity system peak demands in relation to non-industrial consumers. Last May he was appointed a part-time member of the Restrictive Practices Court.

Mr. George William Franklin, founder and senior director of G. W. Franklin & Son, Ltd., electrical contractors, of 29, Fitzroy Square, W.1, died on 28th December.

Mr. E. R. Fell.—The death occurred on 27th December, from injuries received in a motoring accident, at the age of sixty-one, of Mr. Edward Reginald Fell, who was for over twenty-five years the technical representative of Scattergood & Johnson, Ltd., electrical engineers, of Leeds.

Mr. H. Matthews, joint managing director of Crofts (Engineers), Ltd., died on 28th December.

Mr. P. Collinson.—The *Electrical Contractor & Retailer* reports the death of Mr. Percy Collinson, who was president of the Electrical Contractors' Association in 1920-21.

INDUSTRIAL NEWS

National Inspection Council

The National Inspection Council for Electrical Installation Contracting expects to issue the second edition of the Roll of Approved Electrical Installation Contractors in a few weeks' time.

The first edition was issued at the end of May, 1957, and the early issue of a second edition has been necessitated not only by the number of approved contractors enrolled since that date, but also by the large number of incorrect addresses included in the first edition. The Council's inspecting engineers have been able to correct very many of these errors in the course of their routine inspections, but approved contractors whose addresses were incorrectly given in the first edition, or who have other branches not shown in the first edition, are asked to notify the Secretary of the National Inspection Council, 13, Victoria Street, London, S.W.1, of necessary corrections or additions as soon as possible.

The National Inspection Council is being caught up in the large re-building project for Victoria Street, planned to commence this year, and has received advance notice of the termination of its lease. This will cause an interruption in the activities of the organisation, but the Council is hopeful of obtaining new accommodation reasonably close to the present offices, so that the interruption should not be too serious.

More Diesel-Electric Locomotives

The British Transport Commission has placed a contract with the Birmingham Railway Carriage & Wagon Co., Ltd., for 45 main-line diesel-electric locomotives, of 1,550 h.p. each, for the Kent Coast Electrification Scheme of the Southern Region, the first phase of which, providing for the extension of electrification from Gillingham to Ramsgate and Dover via Faversham (including the Sheppey Branch), is due to be completed in 1959. The locomotives will be used mainly for hauling freight traffic, and for inter-regional passenger services which cannot be operated by electric multiple-unit trains or electric locomotives.

These locomotives will have a BB wheel arrangement (two four-wheeled bogies), will be numbered D.6500-D.6544, and classified as Type 3 in the British Railways classification of diesel locomotives. They will have a maximum speed of 80 m.p.h.

Sulzer eight-cylinder, 1,550 h.p. diesel engines (manufactured in this country by Vickers-Armstrongs) will drive the Crompton Parkinson main and auxiliary generators and coach heating generator, all three armatures being embodied in the same rotor. The installation of a special constant voltage coach heating generator, developing 250 kW, is a new departure from the practice of taking power at variable voltage from the main generator. Other equipment manufactured by Crompton Parkinson for each locomotive includes four traction motors, a water pump motor, blower motor, compressor motor and two exhauster motors.

Birlec enters Canadian Market

Mr. K. J. Palmer, of Birlec, Ltd., has recently returned from Canada where the company has established an office in Toronto, under the supervision of Mr. Palmer, whose present position with Birlec is that of London office manager. Until recently, Birlec, Ltd., has been prevented from tendering in Canada by the terms of licensing agreements with other companies. Now, however, with those agreements revised, it is able to sell directly to Canada.

Yorkshire Copper Works and I.C.I.

The Yorkshire Copper Works, Ltd., has announced that negotiations with Imperial Chemical Industries, Ltd., for a merger of its business with the corresponding section of the Metals Division of I.C.I. have been virtually completed and it has issued a circular to shareholders giving details of the proposed merger.

It is proposed to form a new company with the title of Yorkshire Imperial Metals, Ltd., to which the Yorkshire Copper Works, Ltd., will transfer the whole of its business and to which I.C.I. will transfer that part of the undertaking carried on by the Metals Division, which consists of the production, sales and distribution of copper and copper alloy tubes, ferrules, plates and tube fittings, and lead and alloy sheet and pipe, and zinc chloride. The share and loan capital will be equally owned by the two concerns. The name of the Yorkshire Copper Works, Ltd., will be changed to Yorkshire Copper Works (Holdings), Ltd., and its function will be that of a holding company. The proposed merger will be submitted to Yorkshire Copper Works shareholders for approval at an extraordinary meeting to be held on 27th January.

Rubber Cable Prices

The Rubber and Thermoplastic Cable Manufacturers' Association has issued a leaflet setting out the minimum trade prices for rubber-covered cables of sizes 1/-044 to 7/-064 which came into force on 1st January. These prices are in substitution for those in R.C.M.A. minimum trade price list No. 2 issued in October last, and for the time being will apply to cables having either taped or untaped core.

Switchgear for Kuwait

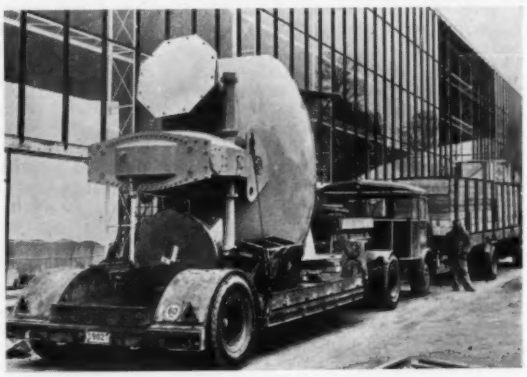
A firm of agents in Kuwait has sent us particulars of 40 substation medium-voltage distribution switchboards and associated equipment required by the Department of Electricity, Kuwait Government. We will pass any requests for information from interested readers to the agents. The closing date for tenders is 3rd March.

A.S.E.E. Dinner

The annual dinner of the Association of Supervising Electrical Engineers will be held on Wednesday, 12th March (6 for 6.30 p.m.), at the Connaught Rooms, London. The principal speaker will be Mr. Geoffrey Lloyd, M.P., Minister of Education.

Cossor in Ireland

The Cossor group of companies has formed a new subsidiary in the Republic of Ireland. This company will distribute Cossor domestic radio, television and record players produced in Dublin and London. It will also market Cossor instruments in the Republic of Ireland and generally



The tank of one of the phases of a three-phase 275 kV oil circuit-breaker which is to be erected in the British Industries Pavilion at the Brussels Exhibition arriving at the building. The circuit-breaker unit, which is being lent by the B.T.H. Co., is over 23ft high and weighs over 10 tons. It is of the type being supplied for the Kariba hydro-electric scheme. A list of concerns supporting the British display at the Exhibition appears on page 61

look after the sale of other Cossor products, including radar and communications equipment. Mr. J. S. Clark, joint managing director of A. C. Cossor, Ltd., is chairman of the company and the trading premises are 51, South William Street, Dublin (telephone: Dublin 72080).

Electrical Manufacture in North-East

A further expansion in the electrical manufacturing industry was reported at a Press conference at Gateshead, held by North-Eastern Trading Estates, Ltd., which owns 310 factories. Mr. S. A. Sadler Forster, chairman, said that employment on the various trading estates reached the peak total of 54,700 last November. This increase was chiefly due to the electrical manufacturing industry, which now employed 13,700 men and women, an increase of 1,500 on the previous year. One electrical group, which was concerned with electronics as well as other electrical work, now employed 4,000 people, and another employed 3,000.

Mr. Forster said it was the Trading Estate Company's policy to help existing firms to expand rather than to attract new firms, but there were one or two places in the North-East where newcomers would be welcomed. He added that the policy of encouraging firms to carry out extensions at their own expense was showing good results, and ten schemes costing £1,000,000 were under way; another eight to cost £600,000 were proposed.

Production Exhibition and Conference

Lord Mills, Minister of Power, will open the Production Exhibition and Conference to be held from 12th to 21st May next at Olympia, London. The sponsors are the Institution of Production Engineers, and the exhibition organisers are Andry Montgomery, Ltd., 32, Millbank, London, S.W.1.

Schoolboys' Own Exhibition

On the British Electrical Development Association's stand at the National Schoolboys' Own Exhibition at the Horticultural Halls, Westminster, which closes to-morrow (Saturday) boys are invited to answer questions posed in a series of "quiz" bays. A typical question is "How long will it take to count to a million?" and to help provide the answer electronic counting machines are shown at work. One of the more important quiz bays is that dealing with careers in the electrical industry.

The Metropolitan-Vickers Electrical Co., Ltd., have a stand on which models and photographs showing the wide range of the company's products are displayed. The company also publicises the opportunities that are available for boys and girls who wish to train for professional careers in electrical or mechanical engineering, chemistry, metallurgy, etc. Of interest among the working models and exhibits on this stand is a model of a 138 MW, 277 r.p.m. hydro-electric generator.

A closed circuit television camera and screen are a feature of the Morgan Crucible Co.'s stand and here visitors can see how they would look on television. The company, which has played a large part in developing the use of graphite in the manufacture of cathode ray and camera tubes, also supplies components for the radio and electronic industry.

Consulting Engineers' Work Abroad

The Association of Consulting Engineers (Inc.), 36, Victoria Street, London, S.W.1, has issued a brochure which describes how consulting engineers work and the advantages to be derived from employing them. It also summarises some of the major works abroad being carried out by the Association's members at January, 1957, which includes a number of thermal power stations and transmission schemes and hydro-electric work.

Aluminium Soldering

Information Bulletin No. 23 published by the Aluminium Development Association, 33, Grosvenor Street, London, W.1, price 2s, describes the soldering methods and equipment currently available for aluminium. Aluminium was once regarded as difficult to solder, mainly owing to attempts at applying methods developed for other metals, but much progress has been made and practical soldering techniques are now available which are acceptable for the joining of aluminium and its alloys in certain industrial applications.

Sufficient data are given to familiarise readers with the basic principles and processes, leaving precise techniques for experimental development. The special processes used in the jointing of aluminium power cables are mentioned.

Fatal Shock from Kettle Lead

At an inquest at Rugby on Mrs. Eva Phyllis Stroud (52), her husband said that on arriving home for lunch he found her lying over the gas cooker in the kitchen. She had been cooking the Christmas pudding. When he touched her he received an electric shock. He switched off the main switch and sent for the doctor. There was an electric kettle by the gas cooker. The switch was off at the socket, but the plug attached to the lead was in the socket and the other end was in his wife's hand. A metal skewer was found on the cooker.

Mr. P. Bradshaw (East Midlands Electricity Board) said it was assumed that, while holding the kettle connector in her left hand, Mrs. Stroud inserted in it the metal skewer which she held in her right hand. The socket was not of a type which was approved by the electricity authorities. After the jury had returned a verdict of "Death by misadventure" the foreman said they thought that householders, before the installation of additional appliances, should get the approval of the electricity authorities.

Regent Street Polytechnic Conferences

The Department of Management Studies, Regent Street Polytechnic, jointly with the British Productivity Council, is holding a one-day conference on cost reduction through simplification on 29th January at the Polytechnic, 309, Regent Street, London, W.1. The fee is £2 11s and further particulars can be obtained from the Registrar, Department of Management Studies, 194, Albany Street, N.W.1. The Department of Management Studies is also holding (in conjunction with the Institute of Materials Handling) a one-day conference on 11th February at the Polytechnic on materials handling. The fee for this is also £2 11s and further particulars can be obtained from the Registrar. Seminars on industrial marketing will be held on eight consecutive Monday evenings, commencing on 24th February, at St. Katherine's House, 194, Albany Street, N.W.1. The fee is £3 3s.

Higher Technology Courses

The London and Home Counties Regional Advisory Council for Higher Technological Education has issued Part II (Spring and Summer Terms) of its bulletin of special courses in higher technology which have been arranged at the various colleges of technology in its area. Copies (3s each, post free) can be obtained from the secretary of the Regional Advisory Council, Tavistock House South, Tavistock Square, London, W.C.1.

Power Plant Testing

A course of eight lectures on "The Acceptance and Operational Testing of Major Power Station Plant after Commissioning" will be held at the Royal Technical College, Salford, on Friday evenings, commencing on 31st January. The fee for the course is £1 15s and particulars and enrolment forms can be obtained from the Head of the Mechanical Engineering Department at the College.

Hotel Design

The January issue of *Design* (the magazine of the Council of Industrial Design) is devoted to the hotel industry. While the lavishly illustrated matter deals mainly with furniture and decoration, some attention is also paid to lighting.

Calendars

Rural scenes in England and Scotland have been selected by Davey, Paxman & Co., Ltd., for their calendar, which has large sheets each showing two months.

A useful desk calendar with monthly cards has been received from Nalder Bros. & Thompson, Ltd.

An 18th century scene entitled "The Critics" makes a colourful picture for the calendar received from Fitter & Poulton, Ltd.

A.E.I. Lamp Factories

On 1st January the lamp and lighting factories in the A.E.I. Group, formerly owned by the British Thomson-Houston Co., Ltd., were transferred to the A.E.I. Lamp & Lighting Co., Ltd. At the same time the headquarters of the company moved from Rugby to Melton Road, Leicester, where the new headquarters building is now nearing completion.

Trade Announcements

The **British Driver-Harris Co., Ltd.,** has opened a South-Western depot at Gloucester Road, Almondsbury, near Bristol (telephone: Almondsbury 2342). Mr. B. S. Lockett is the manager of the new depot.

Henry Righton & Co., Ltd., have been appointed stockholders of non-ferrous metals for **Imperial Chemical Industries, Ltd.,** Metals Division, and henceforth all materials supplied by them will be exclusively of I.C.I. manufacture.

Kayser, Ellison & Co., Ltd., makers of high-grade special steels, are opening a new warehouse in February at Station Road, Coleshill (telephone: Coleshill 2041/2).

The telephone number of **British Jeffrey-Diamond, Ltd.,** Wakefield, is now Wakefield 6071. The telephone number of the spares and service division remains Wakefield 6041.

Mr. C. A. Ray has been appointed a representative for **Marconiphone Radio & Television Sales, Ltd.,** and will eventually cover the South Midlands area and Devon and Cornwall. His address is 36, Cote Lea Park, Westbury-on-Trym, Bristol.

Formica, Ltd., a recently formed subsidiary of Thomas De La Rue & Co., Ltd., announces that all electrical and industrial laminates previously marketed as "Delaron" are now known as "Formica industrial laminates" and the material previously marketed as "Traffolyte engraving or printed material" is now known as "Formica engraving or printed material."

Sunbeam Electric, Ltd., has opened a service station at Victoria Arcade, 32, Deansgate, Manchester, 3, which will be the first of a chain of main provincial centres throughout Britain, in addition to the London and Glasgow offices. The manager of the new service station is Mr. D. Bark.

The new extensions to the works at Bilston of the **Woden Transformer Co., Ltd.,** now nearing completion, will enable the company to extend its range of power transformers up to 10 MVA. Other extensions taking place at the same time will give an additional area of some 20,000 sq ft to provide extra production facilities for electronic equipment, transformers and precision electro-mechanical devices.

The London office of **Permali, Ltd.,** is now at 39, Victoria Street, S.W.1, and it also becomes the London office for the associated companies of Hordern Richmond, Ltd., and Hydulignum-Jabroc (Tools), Ltd. The telephone number (Abbey 6494) remains unchanged.

Craven Brothers (Manchester), Ltd., Stockport, announces that its office in Scotland has now been transferred to 157, West George Street, Glasgow, C.2 (telephone: City 5285). Mr. G. H. Buchanan, who for the past fourteen years has been the representative in Scotland, retired on 31st December. He has been succeeded by Mr. H. Probert, who will also be in charge of the new office of the company in Scotland.

Brook Motors, Ltd., has transferred Mr. W. Ford, sales engineer at its Swansea sales office since 1951, to its sales office at Birmingham. He will replace Mr. H. C. Curtis, who has left the company to take up an appointment abroad.

The Home and Export Sales and the Advertising Departments of **Morphy-Richards, Ltd.,** and **Astral Equipment, Ltd.,** are now at 50, Conduit Street, London, W.1 (telephone: Regent 4080).

Kent Continental Société Anonyme, the Belgian subsidiary of **George Kent, Ltd.,** has moved to 27, rue Paul-Emile Janson, Brussels (telephone: Brussels 38.31.84).

New Zealand Import Licensing

MR. WALTER NASH, the Prime Minister, announced last week that all future imports into New Zealand would be subject to licensing. He said that trading banks would not allocate exchange to importers unless a licence were issued by the Customs Department. New Zealand faced her most urgent overseas exchange position since the depression of the 1930s. The deficit in the balance of payments, Mr. Nash continued, had increased to an estimated £30 million in the calendar year 1957 from £4 million in the year ended last September. On 25th December New Zealand's overseas funds were down to £45·5 million, a reserve sufficient for only six weeks at the current rate of external payments.

Explaining the N.Z. Government's decision to institute the new system of exchange allocation and import selection, Mr. Nash said that, of the alternatives, overseas borrowing had been rejected as too costly and as being no more than a palliative; exchange allocation only as giving no guarantee that essential imports would be obtained or that dispensable ones would not be brought into the country; and alteration of the exchange rate as opening the door to a wide spiral of costs and prices. Although the terms of trade turned against New Zealand in 1957, Mr. Nash stated that the reserves at the end of the year should have been at least sufficient for six months, whereas they were only one quarter of that. To meet the present situation by overseas borrowing might require £50 million. The Government were determined not to take action to curb purchasing power severely by methods that would cause wage cuts and unemployment.

Mr. Nash said that foreign exchange would be allocated to the full for all New Zealand's imports of basic foodstuffs and of raw materials for industry. Unused capacity in New Zealand factories would be called on to replace some less essential imports. Importing contracts already made would be honoured, but where import licences for 1958 were exceeded, the balance would be set against licences for 1959. Explaining the new policy, Mr. Raymond Boord, Minister of Customs, said that all goods ordered but not shipped at 1st January, 1958, became subject to the new licensing provisions.

Electric Motors and Irons Affected

The import licensing schedules contain about 1,000 items grouped into seven categories. These range from essential foodstuffs and raw materials in category "A," for which licences will be granted to the amount applied for from non-dollar sources or Japan, to goods ranging from cement to footwear in category "D," for which there is no allocation and for which licences will be granted only in most exceptional circumstances. For the goods in the other categories, 1956 is taken as the base year and typical cuts are electric motors (reduced by 25 per cent of the 1956 figure), electric irons and razors (75 per cent), dairy machinery (25 per cent), other agricultural machinery (10 per cent), motor vehicles (50 per cent), and unassembled motor vehicles (25 per cent). No figures are at present available for heavy electrical equipment and generating plant.

In 1956 the value of British electrical exports to New Zealand was £10·5 million compared with £12·3 million in the previous year. The value of electric motors exported was £700,000 and of electric hair clippers, dry shavers and irons £218,000. Details of New Zealand's total electrical imports in 1956 were published in our issue of 13th December, 1957.

WIND TUNNEL DRIVES

REQUIREMENTS AND DESIGN PROBLEMS

Four papers dealing with high-speed wind tunnels were presented at last night's meeting of the Institution of Electrical Engineers. They were: "The Development of Variable-Speed High-Power Drives for Large Wind Tunnels" and "A Variable-Frequency Power Installation for Large Wind-Tunnel Drives," by P. McKearney, O.B.E., M.I.E.E., L. S. Drake, A.M.I.Mech.E., A.M.I.E.E., and E. G. Mallalieu, B.Sc., M.I.Mech.E., M.I.E.E.; "Speed Control of Large Wind Tunnels with particular reference to the R.A.E. 8ft × 8ft High-Speed Wind Tunnel," by L. S. Drake, J. H. Fox and G. H. A. Gunnell, A.M.I.E.E.; and "Automatic Setting of the Flexible Walls of a Large Wind Tunnel," by T. Barnes, A.M.I.Mech.E., and C. R. Dunham, M.A., A.M.I.E.E.

AN unusual variable-speed drive installation was described in two papers by Messrs. P. McKearney, L. S. Drake and E. G. Mallalieu (Ministry of Works) at an ordinary meeting of the Institution of Electrical Engineers on 9th January. The papers outlined the requirements of large drives for different types of wind tunnels, leading up to the design problems associated with the drive for the 8ft by 8ft high-speed wind tunnel at the Royal Aircraft Establishment, Bedford, which was described in some detail in the second paper.

Wind tunnels are used to investigate the performance of models of aircraft and projectiles, so that the performance of the full-scale body can be forecast. A compressor drives the air round the closed circuit of the tunnel, through a heat exchanger which extracts the heat of compression, after which the air is accelerated through a contraction section before passing over the model. In practice, the great difficulties in reproducing high-speed flight conditions have led to the development of complex high-power tunnels.

Subsonic and Supersonic Operation

Most compressors for subsonic wind tunnels are driven by d.c. motors with Ward-Leonard control to give a wide speed range with speed holding to accuracies in the order of ±0·1 per cent. For supersonic working there is a limit to the degree of effective contraction since when sonic velocity is reached no further acceleration is possible and a divergent section has then to be added. Higher air speed is then achieved by changing the profile of this convergent-divergent nozzle through which the air accelerates to supersonic speeds before passing over the model. Under these conditions the compressor speed does not require a wide speed range, but control down to about 70 per cent of full speed is desirable on high-power drives to obtain better matching of compressor and tunnel characteristics for power economy. Usually induction motors are used for this type of drive.

Large wind tunnels often have load factors as low as 10 per cent, so that at an establishment where there are a number of these drives control of maximum demand is obtained by load despatching. Considerable advantages are to be gained, therefore, in having a site generating station capable of supplying a range of frequencies so that synchronous motors can be used to drive the wind tunnel compressors over a corresponding speed range. At the Royal Aircraft Establishment, Bedford, two 20 MW variable-frequency gas-turbine sets are being installed. The alternators are two-pole machines which operate over a frequency range of 10 to 50 c/s and generate a voltage proportional to frequency with a maximum of 11 kV at 50 c/s.

The centre of variable-frequency power distribution to the wind tunnel drives is a double-busbar switchboard system (Fig. 1). Each o.c.b. has a current rating of 3,000 A, with a breaking capacity of 1,000 MVA at 11 kV 50 c/s. Each alternator is connected to its own breaker on this board, to which the grid supply is also connected via two 33/11 kV 25 MVA transformers, thus providing either variable frequency or 50 c/s fixed frequency power for the wind tunnel driving motors.

The first wind tunnel to be connected to this system is the 8ft by 8ft high-speed wind tunnel, so called because the size of the working section in which the model is mounted is 8ft square. This tunnel is intended for use in developing high-speed aircraft and missiles and is designed to cover subsonic and supersonic air speeds up to Mach No. 2·8, approximately 2,000 m.p.h.

The tunnel shell, which is constructed entirely of steel, is probably the largest pressure vessel in Europe. As shown in Fig. 2 it consists of four horizontal legs generally circular in cross-section varying from 20 to 47ft in diameter with a total circuit length of 820ft at the centre line. This shell, which is designed for a working pressure range of 1·47 to 60 lb/sq in abs, weighs 5,000 tons and was welded on site from prepared plates under Lloyd's survey.

An integral part of the structure is a cooler which reduces the temperature of the air from the compressor before it enters the working section and passes over the model. The working section is a rectangular structure within the pressure shell comprising two fixed side walls and top and bottom walls which can be flexed to form the convergent-divergent nozzle. The flexible walls, which are made of steel, are each 64ft long, 8ft wide and 1in thick and are supported and fixed by 30 pairs of screw jacks actuated by a hydraulic system controlled electrically

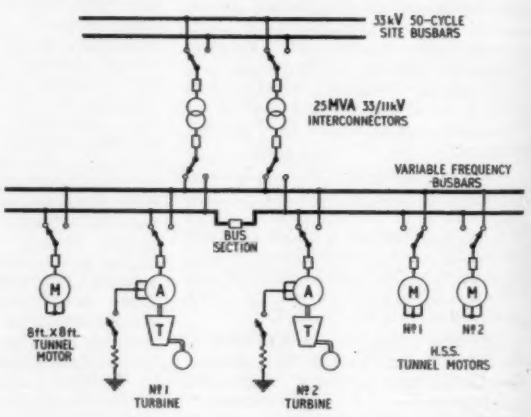


Fig. 1.—Variable-frequency power distribution system

from a punched tape system. The model is mounted downstream of the nozzle and is observed indirectly by a periscope and by a closed circuit television system, whilst Schlieren light equipment displays the air flow pattern.

Air is driven round this circuit by a ten-stage axial compressor of which six high-pressure stages can be replaced by a dummy casing to give a four-stage machine for more efficient working at lower pressure ratios. The compressor rotors are coupled to a 68,000 h.p. eight-pole synchronous motor as in Fig. 3. Two 600 r.p.m. d.c. motors, each of 6,000 h.p., are coupled in tandem to the a.c. motor through a speed-increasing gearbox. The d.c. motors are connected to two similar machines acting as generators in a series loop controlled as a Ward-Leonard system. Hand and automatic control are provided and the drive may be run in any one of three ways:—

(1) With the 68,000 h.p. motor electrically disconnected, the d.c. motors can cover the complete operating speed range of 150/750 r.p.m. when the tunnel air density is adjusted to keep the load within the capacity of the d.c. machines.

(2) The compressor can be run at constant speed by connecting the 68,000 h.p. motor to the grid supply and using the d.c. motors as pony motors to run up to synchronising speed and thereafter to provide additional power.

(3) By connecting the 68,000 h.p. motor to the two 20 MW variable-frequency gas-turbine alternator sets, the compressor can be run over the full speed range 150 to 750 r.p.m. corresponding to 10 to 50 c/s alternator frequency, again using the d.c. motors to run the drive up to synchronising speed (10 c/s) and thereafter to provide power at constant torque.

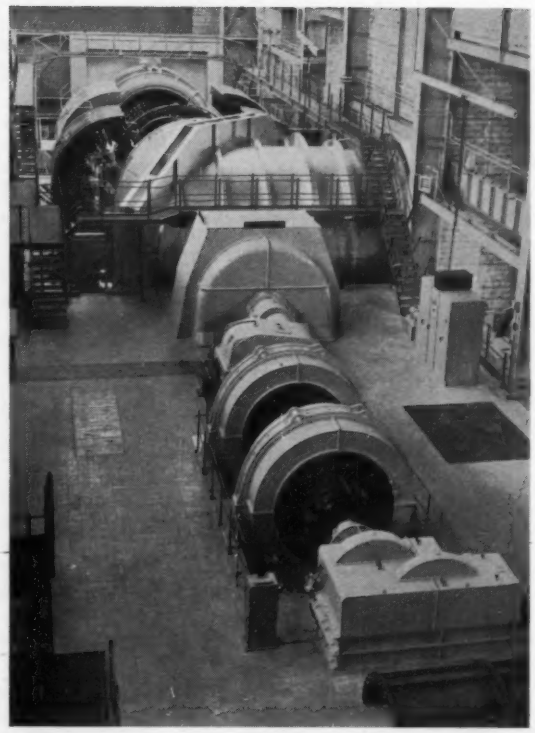


Fig. 3.—Driving motors for the 8ft high-speed wind tunnel

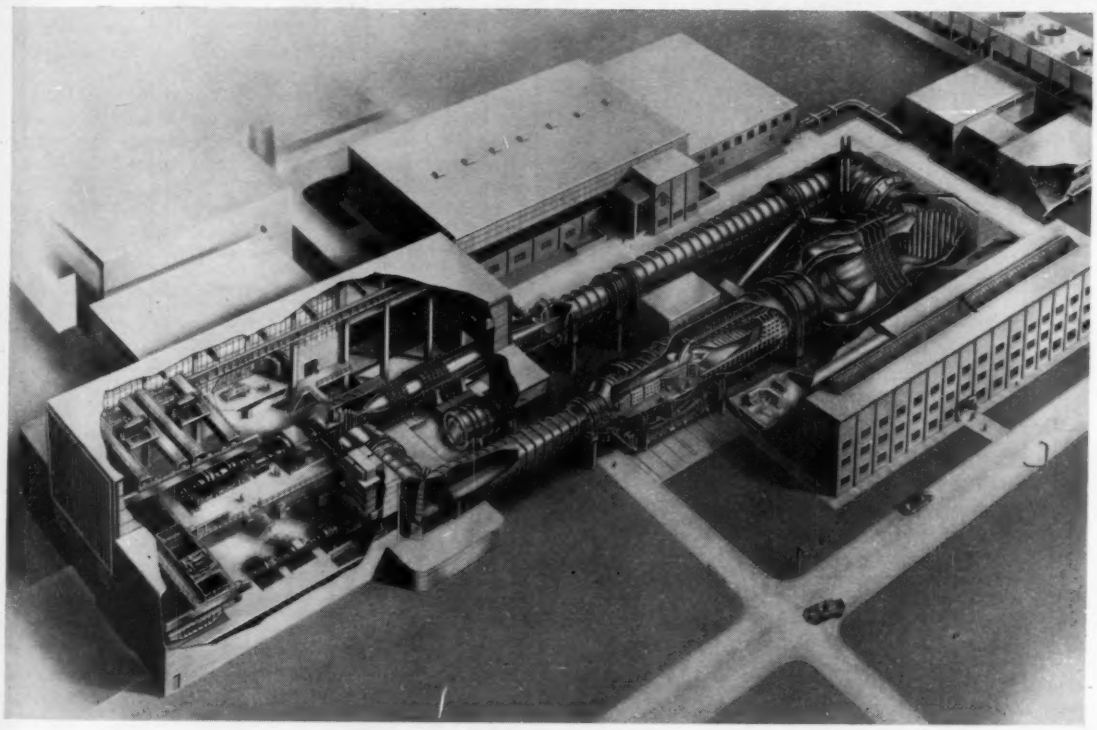


Fig. 2.—General sectional view of the 8ft high-speed wind tunnel

Wind Tunnel Drives

SPEED CONTROL

A paper on speed control of large wind tunnels was presented by Messrs. G. H. A. Gunnell and J. A. Fox (both of the English Electric Co., Ltd.) and L. S. Drake (Ministry of Works), who said that when the design of the speed control system used on the R.A.E., Bedford, 8ft high-speed tunnel was initiated the specified accuracy had not been attained on any similar type of drive in the world. Additionally, the use of gas-turbine driven alternators to provide a variable-frequency power supply to part of the drive was entirely novel.

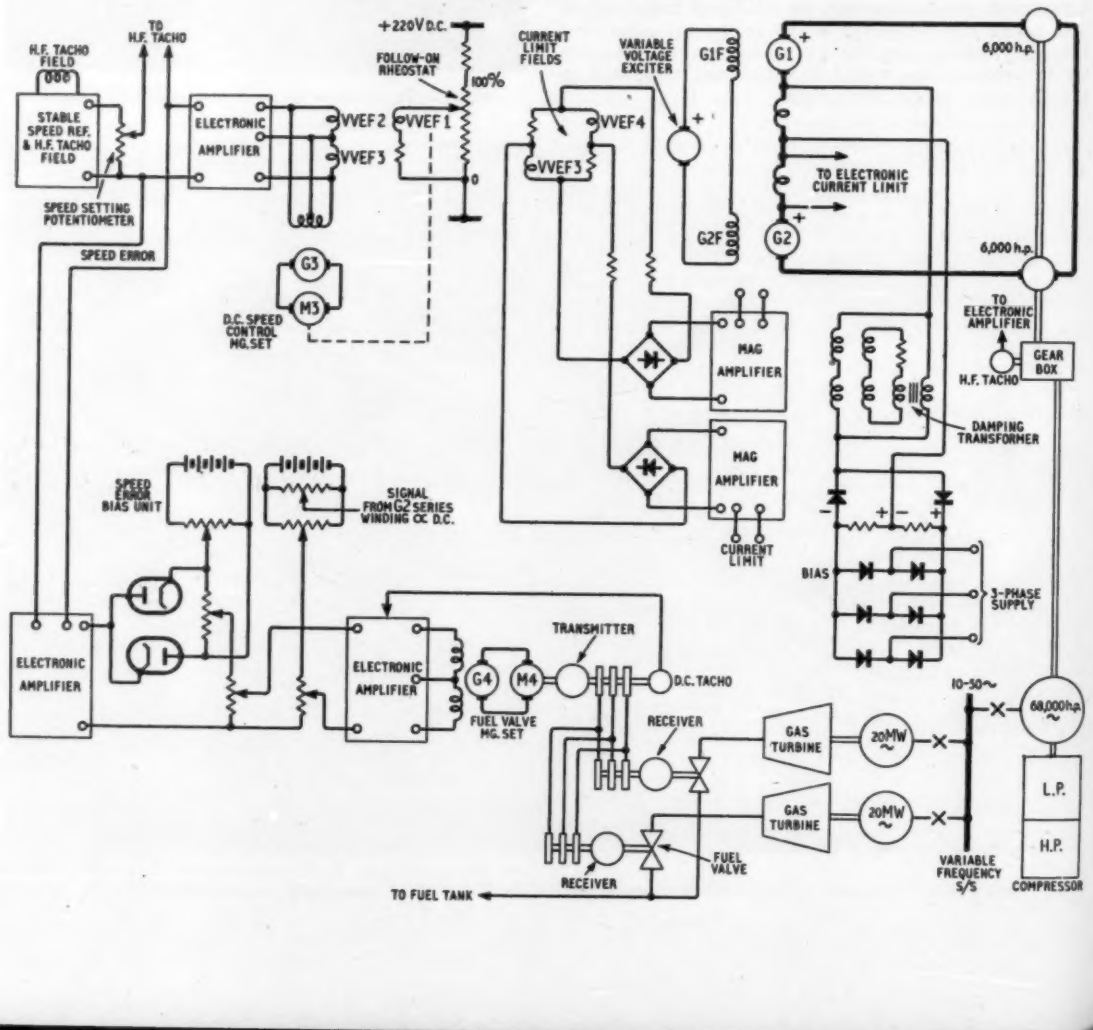
The main features of the drive are the great weight and inertia of the compressor rotors, the wide speed range of 150 to 750 r.p.m. and the high accuracy required from the automatic speed control. The compressor rotors and driving motors of the 80,000 h.p. drive weigh 230 tons with an inertia of 4,200 tons-ft^2. The specified speed holding accuracy is $\pm 0{\cdot}1$ per cent of set speed.

Certain special features in the speed control of wind tunnels capable of operating at supersonic air speeds are not present in ordinary industrial drives. During normal test conditions sudden changes in aerodynamic loading are unlikely, and speed setting and holding accuracy is mainly concerned with positioning and restraining movement of the shock waves which form at air speeds above Mach 1, since, in supersonic work, the air velocity in the working section is dependent, for a given compressor speed, on the throat characteristics of the flexible walls upstream of the model.

During changes from supersonic to subsonic air flow, there is a strong "tunnel shock"; consequently the position of this shock must be kept well downstream of the model. The shock moves downstream as the compressor speed is increased and upstream, towards the model, as speed is reduced, hence an unexpected speed reduction is dangerous. Possible failure of the automatic speed control during steady or near steady state conditions must, therefore, not greatly affect the drive speed. This feature together with high accuracy speed holding requires an accurate speed measuring device capable of maintaining an accuracy better than 0·75 r.p.m. at 750 r.p.m.; a reliable closed-loop speed control with a stable speed reference; and an integral zero-error control.

In order to eliminate long-term variations in the speed reference and measuring device, special consideration must be given to the effect of vibration and changes in ambient temperature, and a considerable amount of research was carried out by the English Electric Co., in conjunction with the Ministries of Works and Supply, in developing a suitable control scheme. A number of

Fig. 4.—Schematic diagram of the speed control system



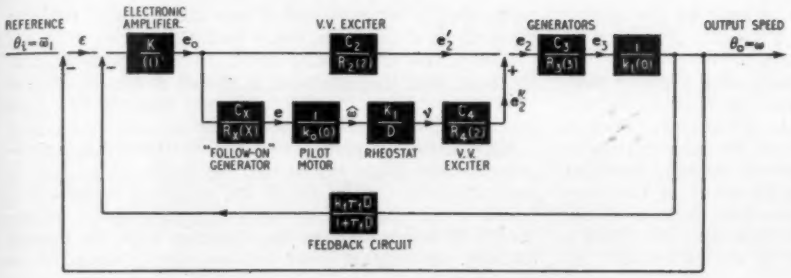


Fig. 5.—Block diagram of d.c. motor control system

speed-error detection systems were considered, including phase and frequency control with frequency references, and in particular special consideration was given to the role of the gas-turbine control. As a result, it was decided that a voltage comparison system, incorporating a highly stabilised voltage reference and tachogenerator field current, with special attention to tachogenerator design, would provide the simplest method of control.

The drive is designed as a composite arrangement, having a Ward-Leonard system with two 6,000 h.p. driving motors and a 68,000 h.p. synchronous motor supplied from the 20 MW gas-turbine-driven alternators. Since it is essential to avoid conflict between the two regulating systems, the d.c. machines were chosen for master control, with the gas turbines providing a follow-up control. This choice allows the faster response and inherent low regulation of the Ward-Leonard system to be utilised for quick correction of speed deviations in either direction, and the gas turbines to adjust the drive base power at a slower rate.

A simplified diagram of the automatic speed control system is shown in Fig. 4. The high-frequency tachogenerator output voltage is compared with the stabilised reference voltage and the resultant error voltage is amplified, after stabilising signals have been added, and applied to the exciter push-pull fields which assist or oppose the main exciting field of the Ward-Leonard generators. In addition the error signal operates the follow-on rheostat which adjusts the main excitation in a direction to reduce the speed error and the electronic amplifier output to zero. Hence under steady, or near steady state conditions, the drive speed is not dependent on the possible failure of one electronic component.

Gas Turbine Regulation

Control of the gas turbines and consequently the a.c. motor power is carried out on the turbine fuel valves by a composite signal which incorporates the speed error signal and a signal proportional to the current flowing in the Ward-Leonard loop, so that the normal action of the gas turbines is to unload the d.c. machines, leaving them on light load and available for further correction of speed changes. The action of the gas turbines is necessarily slower than that of the d.c. machines to avoid oscillations of power due to interaction of the two control systems; this is provided by the composite fuel pattern signal which accommodates the turbine characteristic and allows correction for direct current, but prevents operation by the speed-error component unless the error exceeds 10 per cent. To ensure that, as far as possible, each turbine responds equally to the fuel pattern signal, the fuel valves are driven via a synchronous link.

The mathematical analysis of the stability of the master control illustrated in Fig. 5 shows that a combined integral and proportional system should be used having a gain of 40 with a stabilising feedback over the whole loop. Inverse Nyquist diagrams of the system are shown in Fig. 6, curve (a) without feedback, curve (b) with optimum feedback and curve (c) with increased feedback giving an overdamped system. Based on these results the transient analysis of the system shows, in Fig. 7, that the response to a small step of reference gives a time to cross-over of 2·7 sec, a 10 per cent first overshoot and a settling time of 10 sec.

It was not possible to test the complete speed control system last year but tests on the d.c. portion of the drive, which is the master control, showed that from 75 to 750 r.p.m. the drive speed was held better than ±0·1 per cent over periods of 30 min. One test of five hours' duration at 600 r.p.m. also showed no tendency to deviate outside the ±0·1 per cent limits.

The speed measurements used in these tests were taken by an electronic counter gated over 10 sec periods. The counter input was derived from a photo cell on which a light beam was directed through the spaces between 600 steel pegs fixed in the periphery of the 6ft diameter brake wheel of the drive. Thus at exactly 750 r.p.m. the counter would read 75,000 giving the speed to two decimal places, which is within the limits of accuracy of the equipment.

FLEXIBLE WALL DESIGN

A fourth paper by Messrs. T. Barnes (Ministry of Works) and C. R. Dunham was a communication from the research laboratories of the General Electric Co.,

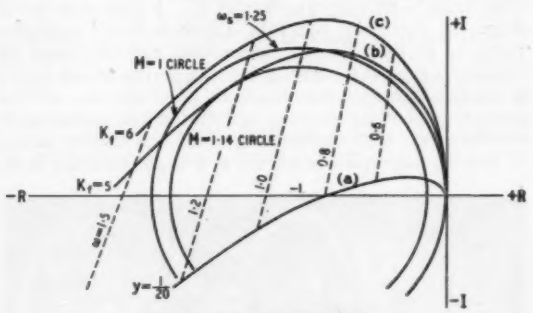
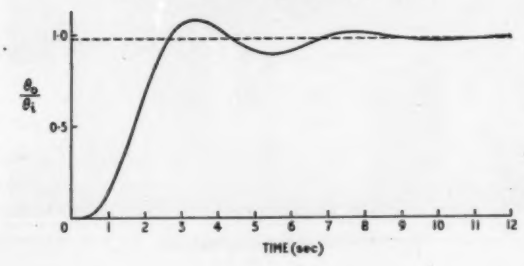


Fig. 6.—Inverse Nyquist diagram

Fig. 7.—Response to step input of reference



Ltd. Its subject was the system adopted for the control of supersonic air speeds up to 2·8 times the speed of sound in the 8ft by 8ft tunnel referred to above.

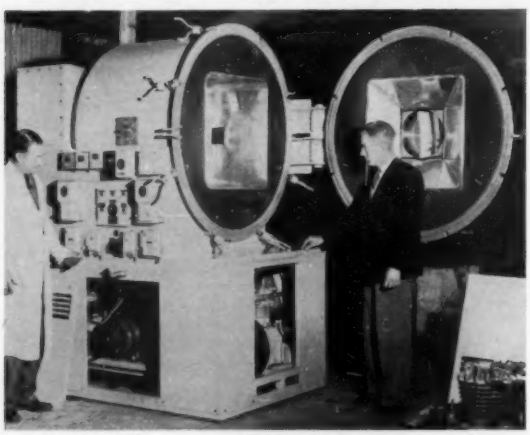
The apparatus consists essentially of a pressure shell containing the air flow, a compressor to circulate the air, a working-section flexible nozzle where air speed is regulated, and a supersonic diffuser for achieving maximum energy recovery. Air velocity at speeds below that of sound is adjusted by varying the speed of the compressor, but to develop supersonic flow (because of the shock waves that accumulate at the flare entry) the passage upstream of the test region has to be altered for different air speeds.

In the tunnel under consideration, the constriction is formed by two flexible steel plates, sliding between side walls and constrained to the required adjustable profile by a series of hydraulically actuated screw jacks. An automatic electrical control system stores the jack-setting data on punched tape and releases it to govern simultaneously the motion of every screw jack with the degree of precision required to adjust the shape of the aerodynamic throat throughout the air-speed range of the tunnel. This method obviates the need to change shaped laminated timber blocks, as hitherto usually employed, to the profile required for each supersonic speed.

Conditions in the Sub-Stratosphere

A NEW machine is in operation at the Royal Aeronautical Establishment, Bedford, which duplicates the conditions found at the sub-stratosphere levels. In addition to the valuable information which will be gained for aircraft and rocket applications, many other industrial experiments can be carried out where an unusual temperature or pressure is required.

The machine, which was specially constructed by the Bedford Refrigeration Co. from original plans by Prestcold Refrigeration, is designed to have a temperature range from −65 deg to +60 deg C. It also provides a range of pressures equal to altitudes from 1,000 to 70,000ft, so that aircraft components can be tested in conditions similar to those occurring during actual flight. A circular viewing window is installed at the front of the cabinet, so that an observer can record the reactions of instruments. The window is constructed of five sheets of heavy armourplate glass set at a slight distance from each other in series in such a way that visibility remains perfectly clear during the whole operation.



High altitude testing machine

The actual test chamber itself measures 27in by 27in by 20in, and this chamber is placed inside a circular vacuum vessel the overall dimension of which is 4ft. This outer case is made of heavy steel plating.

Refrigeration is provided by two Prestcold 3 h.p. compressors, which are run in two stages; the entire unit is automatic and can be set to any required temperature, which it will maintain for an indefinite period. In the tests held before delivery the reduction from the normal ambient temperature down to −60 deg C was achieved in an hour.

Transformer Oil Breakdown

IN a paper presented before the Measurement Section of the Institution of Electrical Engineers on 7th January, Dr. R. Hancox (Atomic Energy Research Establishment, formerly at Queen Mary College, London University) and Dr. H. Tropper (Queen Mary College) reported the result of their studies of breakdown of pre-treated transformer oil under impulse voltages.

Previous workers, the authors stated, had employed open test cells of about 270 gal capacity and voltages up to 900 kV, whereas for the investigations now described a totally enclosed cell had been constructed to hold only 3 gal of test liquid and to withstand 600 kV, which could probably be increased to 800 kV by the use of stress distributors.

Measured breakdown strength was shown to depend not only on the duration of the voltage. In addition the manner of its application might result in variations of the recorded uniform field strength by as much as 30 per cent, while the size, material and preparation of the electrodes could cause a change of 50 per cent. The electrodes described took the form of hemispheres or hemispherically ended rods, thus giving an approximately uniform field for small gap settings. Gaps up to 6in could be obtained and measured within an error of ±0·5 per cent by means of ground spacers in conjunction with a micrometer at the base of the cell. The test cell was constructed of three sections of standard Pyrex glass pipeline. The test chamber itself was 9in in diameter and 18in high and was surmounted by a high-voltage bushing permanently filled with oil similar to that used in the tests.

One of the main factors determining breakdown strength was concluded to be the presence of microscopic surface bubbles on the electrodes and these together with solid particles and fibres in the oil might account for the low strength previously obtained with undegassed or unfiltered oil. The results of the tests described suggested that impulse breakdown of treated oil was due to emission of electrons from the cathode (and their subsequent multiplication in the liquid) under the influence of a gas layer present on the electrode surfaces.

Power Station Conference

A SERIES of international study days on modern thermal and hydraulic power stations will be held from 27th to 31st May next, in Liège, Belgium. The conference will be devoted to discussion of reports concerning boilers, steam and hydraulic turbines and alternators. Copies of the reports will be sent to all participants before the conference. Details can be obtained from the Secretary, Association des Ingénieurs Electriciens sortis de l'Institut Electrotechnique Montefiore, 1, rue de Spa, Liège, Belgium.

GENERATION AND DEVELOPMENT

Supergrid System for South Scotland

To meet the steady growth of load in its area the South of Scotland Electricity Board has approved a scheme for the construction of a 275 kV supergrid transmission system at an estimated cost of £9 million. In all, 273 circuit miles of overhead lines will be erected connecting Kincardine, Edinburgh, Strathaven, Neilston and Windyhill with a spur to Hunterston nuclear power station, and five new 275 kV substations will be built. The first stage of the work is scheduled for completion by 1963 and the whole scheme by 1970. The new grid will be connected with the grid system in England through the existing 275 kV Clyde's Mill-Carlisle line and also with the system of the North of Scotland Hydro-Electric Board.

Applications for Consents

The Electricity (Publication of Applications) Regulations, 1957 (S.I. No. 2227, H.M. Stationery Office, 3d), made by the Minister of Power, set out the requirements for the publicity to be given to applications for consent to the construction or extension of power stations and the erection of overhead lines. They are made under Section 34 of the Electricity Act, 1957.

Electricity Stock

The Electricity (Stock) Regulations, 1957 (S.I. No. 2228, H.M. Stationery Office, 8d), made by the Minister of Power, replace the Electricity (Stock) Regulations, 1948. They make provision for the issue of British Electricity Stock by the Electricity Council under the Electricity Act, 1957, and for dealing with such stock and stock issued by the former Central Electricity Authority.

Pensions Regulations

The Minister of Power and the Secretary of State for Scotland have made the Electricity (Pension) (Amendment) Regulations, 1957 (S.I. No. 2226, H.M. Stationery Office, 3d). Their effect is to include the new Electricity Council as an "Electricity Board" for the purposes of the pensions regulations made in 1948.

Service Centre Displays

The Eastern Electricity Board has awarded prizes in its display competition for 1957 to the following Service Centres:—Area prizes: Large Centres, Chelmsford; medium Centres, Maldon; and small Centres, Ampthill. Sub-Area prizes: Chilterns: Hemel Hempstead, Dunstable and Sandy; Essex: Burnham-on-Crouch, Romford and Wickford; Fens: Huntingdon; Norfolk: Great Yarmouth, Cromer and Martham; Northmet: Barnet, Bishops Stortford and Hitchin; and Suffolk: St. Osyth, West Mersea and Woodbridge.

New Regional Magazine

One of the new Regions of the Central Electricity Generating Board (the Eastern, London and South Eastern) was quick off the mark to make itself known. It not only produced a new monthly magazine, which arrived on 1st January ("vesting day"), but also a calendar for 1958 to go with it. The new publication, "Regional Power," is a 24-page production bearing on its front cover a map of the Region which extends from north of Norwich to the south coast and from west of Aylesbury and Chichester to the east coast.

The first issue contains an article on the chairman of the new C.E.G.B. (Sir Christopher Hinton) and messages to the staff from the regional director (Mr. A. R. Cooper), the controller of the Eastern Division (Mr. W. N. C. Clinch), the controller of the London Division and deputy regional director (Mr. H. J. Bennett), the controller of the South Eastern Division (Mr. W. H. Dunkley), and from Mr. W. C. Parker, who is leaving the South Eastern Division to become regional director of the North West, Merseyside and North Wales Region.

For the rest the magazine (which is edited, designed and produced by Garraway, Ltd.) consists of well-illustrated news of the three divisions which form the region.

Electricity Boards' Sales

In the accompanying table we show the sales to consumers by the twelve Electricity Boards in England and Wales during November last. The national figures show an increase over November, 1956, of 7·1 per cent, but when corrected for weather conditions and working days, the increase is 7·5 per cent.

The figures are provisional and the corrections for weather and the number of effective working days only approximate. No account is taken of supplies received by the Area Boards from other sources, but these are comparatively small and have little effect on the percentage changes.

New Heating Methods

Speaking at a New Year's Day Press conference at the headquarters of the Merseyside and North Wales Electricity Board, Mr. D. H. Kendon, the chairman, expressed the conviction that there was a great future for the various forms of electric heating in the home. In the Board's own Test Laboratory new and effective means for warming the home had been developed, he said. The electrically-warmed carpet underlay (developed by the Board) was, because of its cheapness to install and operate, proving a great success. Production was already running at the rate of 250,000 per annum, and the manufacturers were planning a new factory to cope with the demand in this country and overseas. Also popular, cheap and effective were the luminous heating "Comfort" lamps which the Board had encouraged for home use, particularly in the bathroom.

There was little doubt that all forms of electric floor warming would increase in popularity. The largest block of municipally owned flats in the North of England, at Eldon Street, Birkenhead, was warmed in this way and installations were being carried out in many new private houses and factories.

A combined heating and lighting unit for large buildings had been

ELECTRICITY SENT OUT BY AREA BOARDS FOR THEIR CONSUMERS

Area Board	Totals for November (million kWh)			Twelve Months' Totals Ended 30th November (million kWh)		
	1956	1957	Inc. or Dec. %	1956	1957	Inc. or Dec. %
London	705·7	730·6	+ 3·5	7,017·5	7,030·2	+ 0·2
South Eastern	435·0	466·4	+ 7·2	4,479·8	4,547·8	+ 1·5
Southern	536·6	591·0	+10·1	5,407·9	5,698·3	+ 5·4
South Western	252·5	275·9	+ 9·3	2,751·9	2,844·5	+ 3·4
Eastern	695·8	748·6	+ 7·6	7,119·2	7,371·0	+ 3·5
East Midlands*	579·0	615·5	+ 6·3	6,056·4	6,290·1	+ 3·9
Midlands*	743·0	806·0	+ 8·5	7,796·8	8,039·6	+ 3·1
South Wales*	410·1	444·5	+ 8·4	4,510·8	4,788·5	+ 6·2
Merseyside and N. Wales*	437·9	463·9	+ 5·9	4,732·6	4,947·1	+ 4·5
Yorkshire*	743·2	788·1	+ 6·0	7,851·0	8,202·6	+ 4·5
North Eastern*	431·8	453·8	+ 5·1	4,515·4	4,741·0	+ 5·0
North Western*	779·1	811·7	+ 4·2	8,287·3	8,455·1	+ 2·0
Total all Area Boards	6,749·7	7,196·0	+ 6·6	70,526·6	72,955·8	+ 3·4
Direct Supplies by Central Authority	190·2	233·2	+22·6	2,183·8	2,411·1	+10·4
Grand Total	6,939·9	7,429·2	+ 7·1	72,710·4	75,366·9	+ 3·7
Mainly Industrial Areas*	4,124·1	4,383·5	+ 6·3	43,750·3	45,464·0	+ 3·9
Mainly Non-Industrial Areas	2,625·6	2,812·5	+ 7·1	26,776·3	27,491·8	+ 2·7

* Those in which industrial consumers took over 50% of the total sales in the preceding financial year.

developed by "Manweb" in conjunction with Selex, Ltd., of Kirkby. These fittings had already been installed with complete success in one of the principal churches in Liverpool and, here again, the manufacturers had had so many inquiries that they might have to extend their premises.

The Board was keen to exploit and develop all practical methods of warming the home, office and factory, and experiments in the heating of ordinary strip wooden floors by electricity were in progress, as also were experiments in the design of block storage heaters.

Mr. Kendon also reviewed the Board's general progress, showing that last year 28,000 additional premises were connected, including about 1,400 farms. "As regards the year ahead, I expect at least as good a year for the Board as last year," he said. "We can't possibly lose. If an industry is thriving it will require more electricity to increase output, which means more prosperity for all; on the other hand, if conditions are difficult it becomes necessary to look round for more economical or cheaper ways of doing things, and there again electricity can help."

The amount of capital expenditure to be approved for the next financial year had not yet been settled, but the Board was making the strongest possible representations in view of its special problems.

Overloading Affects Television Reception

Recent complaints about the poor voltage in the Tynemouth area of Northumberland have been supported by local television dealers, who state that after 5 p.m. each day, owing to a drop in voltage, there is a marked decline in the quality of television viewing. One firm stated that 52 random voltage tests nearly all showed results under 240 V. In one case the voltage was only 204. The North Eastern Electricity Board stated recently that the system was being overloaded because consumers were installing more electrical appliances without notifying the Board. Steps were continually being taken to improve voltage at peak periods.

Ayrshire Reinforcement

To meet increasing demand, the South of Scotland Electricity Board proposes to reinforce supplies to Stewarton, Ayrshire. A new 33/11 kV substation will be erected equipped with a 5 MVA transformer and four-panel 11 kV switchboard and associated works, at a cost of approximately £34,000. The work is expected to be completed during 1959.

Rawtenstall Power Station to Close

Hareholme power station, formerly operated by Rawtenstall Corporation, will close down in the early part of 1958. It will, however, continue to distribute power from the grid. Part of the premises may be used as a craft training centre for Central Electricity Generating Board apprentices in East Lancashire.

Water Supply to Hunterston

Ayr County Council has approved in principle of a water supply scheme to cost £78,000 for the nuclear generating station being built at Hunterston. Towards the cost, £60,000 will be paid by the South of Scotland Electricity Board.

Lighting Conversion in Belfast

Belfast, which since 1823 has had gas street lamps, entered a new era on 16th December when the first scheme in the Corporation's programme for replacing gas street lighting by electricity throughout the city was completed. In all, some 16,232 gas lamps will disappear in the next two to three years. The section just completed covers Donegall Place, Royal Avenue, Castle Place and High Street where 75 fluorescent lamps have been installed.

Floor Warming Scheme Rejected

By ten votes to seven Colne Town Council recently rejected a proposal to install floor heating in a block of six flats. Fears were expressed that the tenants would be without an alternative form of heating if there were an electricity failure in winter. Replying to critics who feared that floor warming would not be economical or healthy, Ald. L. Wharton, chairman of the Housing Committee, said the new form of heating would help to get rid of smoke and reduce the incidence of bronchitis.

OVERSEAS

Uganda Development

A brochure entitled "More Electricity for Uganda" issued by the Uganda Electricity Board explains why the Owen Falls hydro-electric scheme is expected to be working to full capacity by about 1965 and why construction of a second hydro-electric project will have to commence about 1960. The brochure is based on the findings of a recent survey made by the Economist Intelligence Unit and published in June, 1957, as a 197-page booklet, "Power in Uganda." Copies of the brochure are being distributed to schools, community development centres, local government councils and other organisations throughout the Uganda Protectorate.

In order to avoid delays, the Board has already instructed its consulting engineers, Sir Alexander Gibb & Partners and Messrs. Kennedy & Donkin, to prepare plans, designs and contract documents for the second dam and power station, which will be constructed at Bujagali, some 4½ miles downstream from Owen Falls. The installed plant in the station is expected to have a capacity of about 180 MW with an output of approximately 830 million kWh a year. Subject to the necessary finance for the Bujagali project being obtained, invitations to tender will be issued in due course, but in any event this is not likely to be before 1959.

Supplies of electricity from the Board's network were switched on in Kaliro for the first time on 19th December. The new consumers are the first to be connected in the second stage of the Board's comprehensive scheme for the distribution of electricity in Busoga.

Electricity for Guam

We hear from Mr. F. L. Moylan, president of the F. L. Moylan Company, that the Government of Guam (one of the Ladrone or Mariana group of North Pacific islands) would like a utility firm to establish an electricity supply in the island. Guam is under United States rule and has a population of about 70,000. Mr. Moylan is a member of a Select Committee set up by the Guam Legislature to help the economy of the island. His address is Moylan Building, Marine Drive, Agana, Guam, M.I.

Small Turf-Fired Stations in Ireland

The Irish Electricity Supply Board has entered into contracts for 65,000 tons of hand-won turf for the small generating stations at Milton-Malby (Co. Clare), Screebe (Co. Galway) and Cahirciveen (Co. Kerry). The contracts are worth £160,000 to turf producers. A fourth generating station at Gweedore (Co. Donegal) is expected to be completed soon. The stations, which each cost about £350,000, are designed to burn a minimum of 30,000 tons of turf a year and give an average annual output of 20 million kWh. They are required to meet the special problem of the western areas. It was recognised that they could not produce electricity as economically as the large turf-fired stations in the Midlands, and also that circumstances might arise in some years in which adequate supplies of hand-won turf for them might not be available and they would have to close down.

Trinidad Power Station Extension

On 26th February the Governor of Trinidad and Tobago, Sir Edward Betham-Beetham, K.C.M.G., will open an extension to the Penal power station of the Trinidad and Tobago Electricity Commission. This extension consists of a C. A. Parsons 20 MW steam turbine set and a Babcock & Wilcox boiler producing 215 klb/hr of steam at a pressure of 620 p.s.i. and a temperature of 865 deg F. There are already two 5 MW British Thomson-Houston turbo-generator sets in the station. With the plant at the Port-of-Spain power station, this will make the total installed plant of the Trinidad and Tobago Commission some 60 MW.

St. Lawrence Power Project

PROGRESS OF CONSTRUCTION

DURING next summer it is expected that the first power supplies will be available from the St. Lawrence project which is being carried out in conjunction with the International Seaway scheme. When completed, in 1960, the total installed capacity will be 1,640 MW, divided equally between the Hydro-Electric Power Commission of Ontario and the Power Authority of New York.

The accompanying photographs, for which we are indebted to the Ontario Commission, give some idea of the size of the scheme and the progress of construction. Photo 1 is an artist's conception of the project as a whole. In the foreground, spanning the river between Barnhart Island and the Canadian mainland, are the adjoining Canadian and American power houses. These have an overall length of 3,300ft and a maximum height above the foundation of 162ft, merging at the international boundary in the middle of the river. The Long Sault Dam, together with approximately seven miles of dyking extending from each side of the power houses, will create the required headpond and will allow any excess flow to by-pass the turbines. A third dam, at Iroquois, will control the outflow from Lake Ontario. New town sites at Ingleside and Long Sault, and Iroquois on the Canadian side, are part of the rehabilitation programme which will involve the resettlement of entire communities from the localities scheduled for flooding. Seagoing vessels will be raised from the lower river level to the newly-formed lake by means of two locks, indicated at the left of the photograph, which form part of the International Seaway.

In Photo 2, taken from the centre of the power dam, the turbines are shown in process of installation on the Ontario Hydro half of the site. At the left, the headworks can be seen towering above the turbine casings which will be enclosed with concrete. Sixteen turbines and generators are being installed on the Canadian side. At the right, concrete is up to the main deck level where generators are being installed.

Photo 3 is an aerial view of the power house dam. The Ontario Hydro administration building, in the right-hand corner, will house the control room and service areas, as well as providing reception and observation facilities.

The St. Lawrence scheme was described by Dr. Otto Holden, chief engineer of the Ontario Commission, in a paper presented to the Royal Society of Arts in London last year (*Electrical Review*, 14th June, page 1123). He said that at the present rate of load growth power from the scheme would be completely absorbed into the system as it became available.

1. *Artist's impression of the St. Lawrence power project*

2. *View from the international boundary showing the installation of turbines on the Ontario Hydro half of the site*

3. *Aerial view of the power house dam*

Financial Section

STOCKS and SHARES

FIRMNESS in the price of Government securities has continued to be the most satisfactory feature of the Stock Exchange. A main support for the gilt-edged market has been the rise in the dollar exchange rate of the pound to the best level for more than three years. Further improvement in the Treasury's latest monthly statement on the gold and dollar reserves also assisted. Discussion is becoming rather more active on the subject of a decrease in Bank Rate before the year is much older. In view of the still very narrow margins of safety, however, views on the point remain decidedly guarded. Industrial shares seem to have fallen back into a position of awaiting their cue from the gilt-edged market and have been behaving reasonably steadily.

Price Changes

The firmness of the gilt-edged market has been reflected in rises of up to a full point in the quotations for British Electricity stocks, and its influence on the state of the industrial market is to be seen in the past week's changes in electrical equipment shares. In this market, A.E.I., G.E.C. and Reyrolle all moved a shilling or so higher. Westinghouse Brake improved to a similar extent in advance of the dividend declaration and were raised further in the market to 34s 6d after the announcement of a 10 per cent payment, which represents an improvement of 1 per cent on last year's and comes from substantially better earnings. The premium on Automatic Telephone new shares increased further to 5s 9d: next Friday, the 17th, is the last date for payment of the final call of 32s 6d. Ericssons were also well supported up to 19s 6d. Hackbridge Holdings recovered 6d of the previous week's setback, following the reduction of the interim dividend, and other useful improvements included those in E.M.I., Electrical Components, B.E.T., S. Smith and Allen West. Brook Motors were called 34s 3d in the market after the appearance of the full report and the chairman's accompanying statement.

Crompton Parkinson Capital

A 50 per cent scrip issue has been distributed by Crompton Parkinson, and the quotation of the 5s shares has been adjusted accordingly to about 9s 6d, with the new shares (transferable free of stamp duty) a fraction higher. This operation involves the capitalisation of nearly £2 million of the company's very ample reserves and brings the issued ordinary capital to £5·8 million. The new shares will rank for this year's dividends, in which shareholders have been advised not to expect an increase as necessarily a sequel to the scrip issue. An interim distribution on account of the year ending next June will be due in May, and the final in October. Last year's 16 per cent dividend would be equivalent to a rate of 10⅔ per cent on the larger capital, so that the yield basis

Price Changes in

Company or Board	Nom. Value	Middle price 6th Jan.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1957 Highest	1957 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	72½	+½	3	3	4 2 9	80	70
Brit. Elec. 1974/77	100	68½		3	3	4 7 6	78½	66
Brit. Elec. 1976/79	100	72½	+½	3½	3½	5 16 6	81½	70
Brit. Elec. 1974/79	100	83½	+1	4½	4½	5 1 9	92½	79½
Overseas Electric Supply								
Calcutta Elec.	£1	16/9		6†	6·8†	8 2 0†	19/-	15/-
East African Power	£1	19/-	−6d	7	7½	7 18 0	21/-	19/-
Nigerian Elec.	£1	16/6		10	10	12 2 6	18/6	16/6
Perak Hydro-Elec...	£1	15/6		10	12½	16 2 6	18/-	13/3
Electrical Shares								
Aberdare Cables	5/-	10/6		17½	17½	8 6 9	12/-	9/9
Aerialite	1/-	6/-		48	51½	8 11 9	6/9	4/9
Allen, W. H.	£1	35/-		10	10	5 14 3	47/3	33/6
Anglo-Portuguese Tel.	£1	21/9		8	8	7 7 3	27/6	20/6
Aron Elec. Ord.	£1	55/-		15	15	5 9 0	60/-	53/6
Assoc. Elec. Ord.	£1	48/9	+1/3	15	15	6 3 0	73/-	48/9
Automatic Tel. & El.	£1	57/6		15	17	5 18 3	75/-	54/6
Babcock & Wilcox	£1	52/6	−1/3	15	15	—	82/6	54/9
Bakelite	10/-	20/-	−1/3	16	15	7 10 0	24/6	20/9
Baldwin, H. J.	2/-	3/9		20	20	10 13 3	5/-	3/9
Barry's Electric	5/-	6/-		—	10	8 6 9	6/6	5/6
British Aluminium	£1	41/9	+6d	12	12	5 14 9	71/3	38/9
Brit. Elec. Traction: Def. Ord. "A"	5/-	20/-	+1/-	22½	25	6 5 0	25/-	17/-
B.I. Callender's	£1	39/9	−6d	12½	12½	6 5 9	55/-	39/6
B.I. Callender's 6% Pref. ...	£1	20/-		6	6	6 0 0	21/9	19/-
British Tabulating	£1	41/3		9	10	4 17 0	56/3	37/6
British Thermostat	5/-	21/3		25	25	5 17 9	27/6	21/3
British Vac. Cleaner	5/-	5/-		15	10	10 0 0	8/-	5/-
Brook Motors	10/-	33/9		25	25	7 8 3	37/6	30/-
Bulgin, A. F.	1/-	4/9	+3d	50	40*	8 8 6	5/6	4/-
Burco Dean	5/-	14/3	+6d	20	22½	7 17 9	14/-	8/9
Cable & Wireless: Ord.	5/-	9/6		10	10	5 5 3	12/6	9/6
4% Loan	100	91½	+1	4	4	4 7 6	92½	89
Chloride El. Storage "A" ...	£1	57/6		17½	17½	6 1 9	68/9	55/9
Clarke Chapman	£1	135/-		22½	27½	4 1 6	9	5½
Cole, E. K....	5/-	17/3	+3d	17½	17½	5 1 6	23/6	16/6
Cossor, A. C.	5/-	5/-		Nil	2½	2 10 0	7/3	5/-
Crabtree	10/-	24/3		20	20	8 5 0	26/-	23/3
Crompton Parkinson Ord. ...	5/-	9/6xc	−6d	16	16	5 12 6*	11/9	9/3
De La Rue	5/-	21/3	−6d	30	35	8 4 9	24/9	16/3
Decca "A"	4/-	25/-	+6d	43½	43½	7 0 0	32/3	22/-
Desoutter	5/-	15/6		30	32½	5 4 9*	17/9	13/9
Dewhurst	2/-	7/6		16½	20	5 6 9	7/9	5/9
Dictograph Tel.	2/-	5/3	−3d	20	20*	7 12 6	6/3	5/3
Dubilier Condenser	1/-	3/3		30	30	—	5/3	3/-
Duport	5/-	9/3		25	25	6 15 3*	10/6	8/6
E.M.I.	10/-	29/6	+1/9	15	15	5 1 9	36/-	23/9
Electrical Components	5/-	7/6	+3d	25	12½*	8 6 9	8/-	6/6
Elec. Construction	£1	22/6		8½	8½	7 11 0	27/6	21/9
Elliott-Automation	5/-	12/-		—	10‡	4 3 3	12/6	10/3
Enfield Cable Ord.	£1	12/9		Nil	Nil	Nil	21/6	12/3
English Electric	£1	47/-	−6d	12½	14	5 19 3	65/-	47/6
English Electric 3½% Pref. ...	£1	12/3		3½	3½	6 2 6	14/3	11/3
Ericcson Tel.	5/-	19/6	+3d	20†	22‡	2 16 6*†	25/-	17/-
Ever Ready	5/-	14/9	+9d	35	37½	6 7 0*	20/-	14/-
Falk Stadelmann	£1	36/3		17½	17½	9 13 0	40/6	35/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

with the shares at their present price is 5·6 per cent.

Dividend Cover

Crompton Parkinson's last annual report, issued in November, showed that a moderate increase in 1956–57 carried the company's net income over the million mark for the first time. The ordinary distribution of 16 per cent was the same as before, but was declared as all dividend, whereas previously 6 per cent of the total had been described as a bonus. It left two-thirds of the available surplus to be ploughed back into the business. In the report there were references to the formation of Atomic Power Constructions, Ltd., in which Crompton Parkinson is a founder member and is associated with International Combustion, Richardsons Westgarth, Elliott-Automation and others. The group's unexecuted order book was said to be in a healthy condition.

Electrical Investments

Company or Board	Nom. Value	Middle price 6th Jan.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1957 Highest	1957 Lowest
Electrical Shares—continued								
G.E.C. Ord.	£1	38/9	+1/3	14	12½	6 9 0	58/9	37/6
G.E.C. 6½% Pref.	£1	20/6		6½	6½	6 6 9	23/6	19/6
General Cables	5/-	11/6xd		30	24	10 8 9	15/6	11/6
Greenwood & Batley	£1	47/6		17½	17½	7 7 3	51/3	45/3
Hackbridge Holdings	5/-	10/9xd	+6d	30	20	9 6 0	21/9	11/3
Hackbridge & Hewittic	5/-	11/3		23	20	8 17 9	16/-	10/-
Head Wrightson	5/-	18/9	+3d	20	22½	—	24/3	16/6
Heatrae	2/-	4/9		15	15	6 6 6	4/9	4/-
Henley's	10/-	11/-		11½	11½	10 9 3	17/-	11/-
Holophane	5/-	13/-		30	37½	8 13 0*	15/9	10/3
Hoover	5/-	32/6		50	50	7 13 9	44/-	24/9
I.C.I.	£1	39/6	+1/9	10	10	5 1 3	46/6	36/3
Intl. Combustion	5/-	20/6	−6d	20	22½	5 9 9	30/-	19/3
Johnson & Phillips	£1	18/-	−9d	15	10	11 2 3	34/6	18/9
Lancashire Dynamo	£1	32/6		11	11	6 15 3	45/9	33/6
Laurence, Scott	5/-	14/3		15	15	5 5 3	19/9	13/9
Lister, R. A.	£1	25/9xd		10	10	7 15 3	33/9	23/3
London Elec. Wire	£1	41/3		12½	12½	6 1 3	53/9	40/9
Lucas, J.	£1	28/-		7½	7½	5 7 3	36/6	27/6
Marconi Marine	£1	30/-		10	10	6 13 3	37/-	30/-
Marryat & Scott	2/-	10/6		30	35	6 13 3	13/-	8/-
Mather & Platt	£1	47/-		15	15	6 7 9	63/9	47/-
Metal Industries	£1	23/3	+6d	Nil	9	7 14 9	30/-	20/3
Midland Elec. Mfg.	£1	47/6		12½	12½	5 5 3	52/6	45/-
Morphy-Richards	4/-	15/-		50	20*	5 6 9	20/-	11/6
Murex	£1	57/6	−9d	20	20	6 19 3	79/6	58/3
Newman Ind.	2/-	2/9		10	10	7 5 6	2/11	2/1
Oldham & Son	1/-	2/6		17½	17½	7 0 0	3/-	2/3
Parnall (Yate)	5/-	6/9		12	12	8 17 9	8/9	5/9
Parsons, C. A.	£1	52/6		8½	7½*‡	—	71/3	45/-
Plessey	10/-	60/-		30	30	5 0 0	86/3	60/-
Pye "A" Deferred	5/-	12/6		12½	12½	5 0 0	20/-	12/-
Reyrolle	£1	81/3	+1/3	16½	17½	4 6 3	110/-	72/-
Rheostatic	4/-	7/9		18½	12½*	6 9 0	10/-	7/-
Richardsons Westgarth	5/-	14/9		16½	16½	5 13 0	20/-	13/6
Scottish Cables	4/-	13/3		27½	27½	8 6 0	19/3	13/3
Simon-Carves	5/-	25/-		28½	20*	4 0 0	36/3	23/9
Smith (England), S.	4/-	7/6	+3d	17½	20	5 6 8*	8/-	6/3
Southern Areas	£1	11/3		7½	7½	13 16 9	20/-	11/3
Strand Elec.	5/-	5/9		15	15	13 0 9	8/-	5/9
Sturtevant	5/-	17/9		15†	15†	4 4 6†	27/-	17/9
Sun Elec.	£1	47/6		25	25	10 10 6	47/6	42/-
Switchgear & Cowans	5/-	9/3	−3d	25	25	13 10 6	15/6	9/6
Taylor Tunnicliff	5/-	11/9		15	15	6 7 9	13/9	11/9
T.C.C.	10/-	37/6		25	25	6 13 3	41/3	35/-
T.C. & M.	£1	22/6	−1/-	8½	8½	7 11 0	31/-	23/6
Telephone Mfg.	5/-	5/6		10	10	9 1 9	8/-	5/3
Telephone Rentals	5/-	10/-xd		12½	12½	6 5 0	12/6	9/6
Thompson (John)	5/-	25/-		25	25	5 0 0	37/-	23/6
Thorn Elec.	5/-	21/3		15	17½	4 2 3	26/3	16/3
Thornycroft	£1	27/6		12½	12½	9 1 9	37/6	21/3
Tube Investments	£1	52/9	+3d	13½	15	5 13 9	70/-	51/3
Vactric	5/-	15/-xd	+3d	17½	25	8 6 9	23/9	12/9
Veritys	5/-	6/9		12½	12½	9 5 3	9/3	6/9
Walsall Conduits	4/-	11/9	+3d	20	20	6 16 3	15/-	11/-
Ward & Goldstone	5/-	23/6	−6d	35	40	4 5 0*	29/-	18/6
Watford	2/-	6/-		25	25	8 6 9	6/9	5/9
Westinghouse	£1	33/9	+1/3	18	10*	5 18 6	41/3	28/9
West, Allen	5/-	10/-	+3d	15	15	—	13/6	9/6
Wolf Electric	5/-	9/-		20	20	5 11 0*	13/9	8/9

British Electric Resistance

At last month's meeting of British Electric Resistance approval was given to the doubling of the authorised capital, to £200,000, but the chairman regarded prevailing market conditions as unpropitious for the share issue which had been under consideration before the rise in Bank Rate. As he pointed out, however, the company is now in a position to raise fresh capital by that means whenever the opportunities become more favourable. In 1956–57 the company's earnings made good progress, and the chairman anticipated another good year, subject to the usual reservations. At about 4s 9d, the 2s shares are showing a yield of over 8½ per cent on the 20 per cent rate of dividend paid for the last four years.

Colvern Interim

Colvern 5s shares were quoted higher at 14s 6d after the company's declaration of a 7½ per cent interim dividend on account of the year ending next March. This is at the same rate as the last corresponding payment, which however was made before a 20 per cent scrip issue. It was followed by a 12½ per cent final payment on the present enlarged capital of £210,000, and the total distribution was notably well covered by the earnings of 1956–57. A good increase in the latter was ascribed in the report to larger turnover and improved methods, without recourse to price increases. At the present price of the shares (which were quoted up to 18s 9d in the earlier part of last year) the yield on a 20 per cent dividend works out at 6·9 per cent.

Burco-Dean Issue

A 50 per cent scrip issue is proposed by Burco Dean, and in a statement accompanying the annual report the company expects the current year's profits to provide for a dividend of not less than 15 per cent on the capital so increased. That rate would be equal in effect to the 22½ per cent paid for the year ended last September on capital of £512,500. As already known from the preliminary figures, an improvement of 50 per cent in the group trading profits for that period made good the setback of the previous year, and provided threefold cover for the ordinary dividend distribution. From the report, it is evident that a large contribution to the results came from the electrical division, which was hard pressed to meet all demands. There is a yield of 7·9 per cent on the 5s shares at 14s 3d.

REPORTS and DIVIDENDS

The Plessey Co., Ltd.—The annual meeting was held on 30th December. In his circulated review of the activities of the group during the past year, Mr. A. G. Clark (chairman and managing director) said that profit margins had been lower because they had endeavoured, where practicable, to hold prices steady in spite of rising costs. Referring to American co-operation, he said that it was now over 25 years since their first licence with an American Corporation was signed. To-day they had twenty such agreements covering a wide range of equipment, components and raw materials. The turnover to-day covered many products in many fields, of which radio and television were only two. In the aircraft field they had continued to make progress as suppliers of mechanical and electrical equipments to the Government and the aircraft industry.

The electronics group was concerned not only with radio and television, but also with telecommunications, where they were making a substantial contribution to the equipments of all three Services under the auspices of the Admiralty and the Ministry of Supply. After referring to the agreement with the Philco Corporation of Philadelphia for the manufacture in this country of transistors and semi-conductors, Mr. Clark said that Plessey International, Ltd., was steadily increasing its direct exports and during the year under review had reached a record.

In addition to the factory for transistors which they were erecting at Swindon, the Swindon Corporation was erecting for them on its new Trading Estate a factory of over 350,000 sq ft.

At an extraordinary meeting which followed the annual meeting approval was given to an increase in the nominal capital by £1,000,000, represented by 2,000,000 additional ordinary shares of 10s each.

R. A. Lister & Co., Ltd., will hold their annual meeting on 17th January. In his review of the company's activities, Sir Percy Lister (chairman) says that the year had not progressed far before the Suez crisis and its repercussions had to be faced. Their undertakings were, at that time, some 40 per cent through the completion of a substantial Egyptian Government contract, and in anticipation of increased business in the Middle East they had incurred forward commitments in that area. They have since completed the Egyptian contract and liquidated the commitments mentioned. Certain fixed assets of the Australian subsidiary have been sold, and the benefits which have accrued to date should reflect satisfactorily on the future trading results of this subsidiary. They have, either by licensing third parties or through their subsidiary companies, commenced part manufacture in a number of countries in which local legislation and import restrictions have left them no alternative. Two new companies have been formed during the year, namely the Lister Blackstone Rail Traction Co., which will concentrate on this growing section of their activities, and the Lister Blackstone G.m.b.H., Germany.

Burco Dean, Ltd.—The annual meeting will be held on 29th January. In his circulated statement, Mr. D. K. Ward (chairman) says that the restrictions on the sale of consumer durable goods, whilst having a diminishing effect, seem likely to continue, but the group has fully recovered from the depression of 1955-56 to the position it had reached previously. In the electrical division the factory, despite the full use of extensions completed in 1955, is under some strain, and they have not been able to satisfy customer demands as promptly as they would wish. Plans are in hand for the fullest development possible on land at present undeveloped within the confines of the factory, and it is hoped that these extensions will be completed before the end of 1958. During the year a selling policy has established the brand name "Burco" to the products of the electrical division, and Mr. Ward mentioned the introduction of the "Baby Burco," an electric 5-gallon portable wash boiler, and the Burco "Tumblair" electric drying machine. A survey of the European market has enabled them to commence the design and development of new products, which they believe will be suitable for this and other export markets.

Relay Exchanges, Ltd.—An extraordinary meeting will be held on 30th January at which resolutions will be presented increasing the capital of the company to £1,000,000 by the creation of 1,000,000 ordinary shares of 5s each.

The company announces that it has acquired the whole of the issued share capital of the Multi-Broadcast group of companies—Multi-Broadcast (Medway), Ltd., Multi-Broadcast (Kent), Ltd., Gravesend Relay Service, Ltd., and Multi-Broadcast (Television), Ltd.

The Coventry Gauge & Tool Co., Ltd., reports a profit for the year to 31st August last of £341,472, as compared with £356,556 for the preceding year, and after providing £207,108 for taxation, the net balance is £134,364 (against £162,027). General reserve receives £50,000 and it is proposed to pay a final dividend of 4⅛ per cent, tax free, making 6½ per cent for the year (unchanged). The balance carried forward is £185,719 (against £148,981 brought in).

W. H. Allen, Sons & Co., Ltd., are paying an interim dividend of 2½ per cent (unchanged).

Head, Wrightson & Co., Ltd., have announced an interim dividend of 5 per cent (against 7½ per cent) on increased capital.

The Ebonite Container Co., Ltd., has declared an interim dividend of 10 per cent (against 7½ per cent).

New Companies

Simms Motor Units, Ltd.—Registered 31st December. Capital £2,500,000. To acquire the business of manufacturers of fuel injection, electrical and ignition equipment and other goods now carried on by Simms Motor Units, Ltd., etc. Solicitors: Slaughter & May, 18, Austin Friars, E.C.2.

Hepworth Water Tube Boilers, Ltd.—Registered 30th December. Capital £100. To act as consultants, experts and advisers in relation to the production, storage and distribution and utilisation of power of all kinds; civil, mechanical, marine and electrical engineers, etc. Directors: J. F. Booth and I. S. Brown. Solicitors: Wright & Bull, 25, Old Buildings, Lincoln's Inn, W.C.2.

Dynamic Controls, Ltd.—Registered 6th December. Capital £200. Engineers, etc. Directors: F. Carrodus and Mrs. Phyllis M. C. Carrodus. Regd. office: 9, Verney Road, Royton, Oldham.

T.D.B. Electrics, Ltd.—Registered 5th December. Capital £2,000. Electrical engineers, etc. Directors: Mrs. Betty M. Thatcher, E. J. Dallow and H. G. Bowles. Regd. office: 55, Poole Road, Ewell.

Kayblex Electronics, Ltd.—Registered 10th December. Capital £1,000. Manufacturers of and dealers in radio, radar, television, electronic and electrical components, accessories. Directors: G. T. H. Chinchen, Mrs. Edith E. Taylor and V. Taylor, Jnr. Regd. office: Bridge Street, Ebley, Stroud, Glos.

Wordsley Engineering Co., Ltd.—Registered 13th December. Capital £100. General engineers, manufacturers of and dealers in electrical, industrial and household equipment, etc. Directors: S. E. Williams and Dorothy Williams. Regd. office: George Street, Wordsley, Stourbridge, Worcs.

Electronics (Croydon), Ltd.—Registered 13th December. Capital £100. Electronic and automation engineers, consultants, designers and manufacturers of all kinds of electronic controls, etc. Directors: F. E. Martin and B. H. Anderson. Regd. office: 266, London Road, Croydon, Surrey.

Electronics (Finsbury Park), Ltd.—Registered 13th December. Capital £100. Electronic and automation engineers, consultants, designers and manufacturers of all kinds of electronic controls, etc. Directors: F. E. Martin and J. M. Clark. Regd. office: 29, Stroud Green Park, Finsbury Park, N.4.

Electronics (Ruislip), Ltd.—Registered 13th December. Capital £100. Electronic and automation engineers, consultants, designers and manufacturers of all kinds of electronic controls, etc. Directors: F. E. Martin, R. C. Beasley and P. R. H. Bull. Regd. office: 44/6, Windmill Hill, Ruislip, Middlesex.

G. H. Graves and Son, Ltd.—Registered 16th December. Capital £500. Wholesalers, factors, manufacturers and merchants of electrical appliances and equipment of all kinds, etc. Directors: G. H. Graves, Mary Graves, T. L. Graves and A. Cooper. Regd. office: 55, King Street, Knutsford, Cheshire.

Tucker Bros. Radio & Television, Ltd.—Registered 28th November. Capital £10,000. Testers of and dealers in electrical and other apparatus, etc. Directors: S. M. Tucker, Mrs. Queenie A. Tucker, J. E. Tucker, D. S. Tucker and Mary P. Tucker. Regd. office: 32, Station Lane, Hornchurch.

Bankruptcy

J. R. Short, formerly carrying on business at 11, Rutland Avenue, Bishop Auckland, electrical contractor.—Second supplemental dividend of 6¾d in the £, payable on and after 15th January at the Official Receiver's Office, Clarendon House, Clayton Street West, Newcastle-upon-Tyne, 1.

NEW ELECTRICAL EQUIPMENT

Miniature Instruments

A new range of miniature a.c. and d.c. panel instruments is offered by the ENGLISH ELECTRIC CO., LTD., Stafford. These are d.c. permanent magnet moving-coil instruments with rectifiers for operation on a.c., frequency range 20 to 10,000 c/s, and with thermo-couples for high-frequency applications up to 1 megacycle. All types are supplied in black Bakelite phenolic cases and have nominal scale lengths ranging from 2 to 4½in.

The design incorporates a sintered composite anisotropic magnet with mild-steel pole pieces. Bearing centres are jig bored in relation to the centre pole of the magnet system, the jewelled bearings being located in the die-cast movement holder. This construction gives good mechanical stability and high flux density with low leakage flux, ensuring high sensitivity, low power consumption and a high torque/weight ratio. Sword-shaped pointers are fitted as standard, but knife edge

English Electric d.c. voltmeter

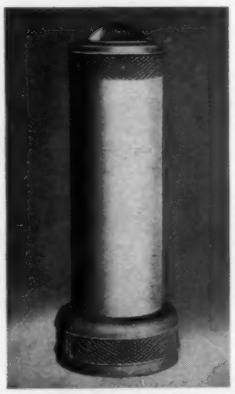
pointers (with anti-parallax mirror if required) and spade pointers are also available.

Accuracy of all instruments conforms to B.S. 89 : 1954, and laboratory tests show that the instruments can withstand shocks of up to 200 G in any plane and that the movements are not affected by repeated oscillation and severe vibration conditions.

Bed Warmer and Convector

A simple bed warmer, which uses only a 40 W electric lamp as its heating source, has recently been placed on the market by WADES (HALIFAX), LTD., Arden Works, Fenton Road, Halifax, Yorks. In use this "Kosybed" warmer is stood in an upright position between the bedclothes, forming a tent-like space in which the warmed air circulates. The lamp is protected by an expanded metal cylinder and the complete warmer has a golden bronze finish. It weighs 1¼ lb and measures 8⅜in high by 6⅜in diameter. The price, without lamp, is £1 4s including purchase tax.

Wades "Kosybed" bed warmer



Wades "Seven-Fifty" low-weight convector heater

The company has also introduced a small convector heater, the "Seven-Fifty," suitable for use in the nursery or for background heating in larger rooms. The loading is 750 W and the total weight is only 7 lb. The standard model is priced at £3 17s and the pilot light model at £4 6s 7d, both prices including purchase tax in the United Kingdom.

Domestic Refrigerator

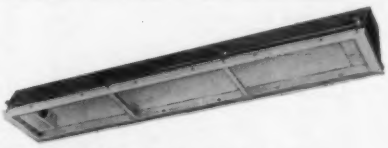
Many improvements have been incorporated in the latest "Prestcold" domestic refrigerator just announced by the PRESSED STEEL CO., LTD., Cowley, Oxford. This new model, the "Big Four," has a gross capacity of 4·3 cu ft and a shelf area of 7·8 sq ft.

Two full-width shelves, a fold-down top shelf and an extra wide frozen food locker are provided, as well as a large chill tray and a butter keeper. The door shelves will accommodate five pint bottles of milk, plus eggs, etc. The refrigerator has automatic temperature control, an interior light and there is a choice of right- or left-hand door opening. It measures 37¼in high by 22¼in wide by 24in deep and the finish is in star white or cascade cream with a choice of red, cream, green, ice blue or white for the table top. The price is £55 10s 7d plus £24 5s 5d purchase tax in the United Kingdom.

Prestcold "Big Four" refrigerator

Lighting Fittings

In our issue of 27th December (page 1175) under the above heading reference was made to a new series of "Gold Label" de-luxe fluorescent fittings introduced by the Stella Lamp Co., Ltd. The accompanying picture was incorrectly stated to be a dustproof fitting; it was in fact a 5ft 80 W reeded "Perspex" diffuser fitting. A photograph of the dustproof fitting is reproduced above.



5 ft 80 W dustproof "Gold Label" fitting (Stella Lamp Co., Ltd.)

Prismatic Bulkhead Fitting

A new prismatic bulkhead fitting, designed both for surface and partially recessed mounting, is now being marketed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. The fitting, constructed of rust-proofed pressed steel, houses one 100 W lamp and the porcelain b.c. lampholder is mounted on a white enamelled internal reflector. Earthing terminals are provided on the body of the fitting and on the reflector. It is obtainable fitted with either clear or obscured prismatic glass which is sealed to the body by means of a "neoprene" gasket. The price with either type of glass is £1 9s 8d.

G.E.C. prismatic bulkhead fitting

Decorative Lighting Set

In the note under this heading in our issue of 27th December (page 1174) the price of a box of twelve lamps for the Ekco-Ensign "Gala" lighting set was stated to be £1 6s 6d plus 4s 6d purchase tax. This should have read £1 6s 6d including 4s 6d purchase tax.

DOMESTIC ELECTRICAL EQUIPMENT

Wash Boilers

BESIDES boiling clothes and generally providing hot water for home laundry purposes both quickly and conveniently, the electric wash boiler can readily serve for other purposes such as fruit bottling, boiling vegetables, and, where a hot water system is not installed, supplying hot water for baths. Present-day models are designed to give many years of service and the latest cabinet types, stove enamelled in various colours, blend well with other kitchen equipment.

Capacities of the standard-sized models range from 8 to 10 gal (10 gal being the usual size) and there are also smaller 4 gal " bucket " types suitable for the flat dweller or for use in confined spaces. The loading of the standard models is usually in the region of 3 kW and the time taken to heat 10 gal of water to boiling point from approximately 55 deg F is about 90 minutes.

Most models are controlled by either rotary three-heat switches or foot-kick switches, whilst some are push-button operated. To safeguard the boiler should it be switched on when empty or left to boil dry, an automatic cut-out device can be provided as an optional extra with many makes. Hand-operated wringers and agitators are among other extras. Since our last survey a few manufacturers have made a reduction in the prices of certain models but on the whole prices remain at much the same level. The wash boiler is not subject to purchase tax.

Manufacturer	Name or Model	Type	Size (H.W. & D. in inches)	Tub Capacity	Wringer	Agitator	Loading	Method of Control
ALDER ELECTRICAL APPLIANCES, LTD., Rushworth Street, Burnley, Lancs.	Alder " XR "	Round	27½ × 19½ diameter	10 gal	No	No	3 kW	3-heat, 2 foot-press switches
AMPLEC, LTD., Grange Works, Grange Lane, Accrington.	" Wringer Amplewash "	Cabinet	36½ × 18½ × 18½	10 gal	Yes (plus 14s purchase tax)	Optional extra	3 kW	Rotary 3-heat switch
	" Amplewash " Boiler	Cabinet	30 × 16½ × 16½	10 gal	No	No	3 kW	Rotary 3-heat switch
	" C.R.S."	Round	27½ × 17½ diameter	10 gal	No	No	3 kW	2 foot kick switches
	" R.J."	Round	27 × 16½ diameter	8 gal	No	No	3 kW	2 foot kick switches
	" Star-Styled "	Cabinet	29½ × 16½ × 16½	10 gal	No	No	3 kW	Rotary 3-heat switch, cut-out 25s extra
BRADLEY & CO., LTD., Albion Works, Bilston, Staffs.	" Beldray " 329	Round	—	4½ gal	No	No	2 kW	Direct from plug. Cut-out
BRUNLEC APPLIANCES, LTD., Junction Mills, Junction Street, Burnley.	Boiler/Wringer " XLW "	Cabinet	29½ × 16 × 17½	10 gal	Yes (plus 9s 3d purchase tax)	Optional extra	3 kW	3-heat push-button switch
	" XL2 "	Cabinet	29½ × 16 × 17½	10 gal	No	No	3 kW	3-heat push-button switch
	" 560 "	Round	27 × 19 diameter	10 gal	No	No	3 kW	3-heat foot-press switch
	" XL "	Cabinet	28 × 16½ × 16½	10 gal	No	No	3 kW	Standard cut-out
BULPITT & SONS, LTD., Icknield Street, Birmingham, 18.	" 600 "	Round	—	4 gal	No	Percolating type turbulator	2 kW	Direct from plug
BURCO, LTD., Rose Grove, Burnley.	" Baby Burco " 761.S	Round	19½ × 16 diameter	5 gal	No	No	2 kW	3-heat d.p. switch
	" Baby Burco " E.761.S	Round	19½ × 16 diameter	5 gal	No	No	2 kW	3-heat d.p. switch
	350 F	Round	26½ × 16½ diameter	8 gal	No	No	2·625 kW	3-heat foot-press switches
	375 AS	Round	28 × 17½ diameter	10 gal	No	Agitator lid unit available £2 10 6 extra	3 kW	3-heat rotary switch
	E.300 AS	Cabinet	28½ × 16¼ × 19	10 gal	No	No	3 kW	3-heat d.p. switch
	763 DX	Round	31½ × 19½ diameter	16 gal	No	No	4·5 kW	3-heat rotary switch
	E.950 AN	Cabinet	30½ × 17⅞ × 21½ Height with wringer in position 35in	10 gal	Yes (plus 11s 9d purchase tax)	Agitator lid unit available £1 13 4 extra	3 kW	3-heat hand level switch

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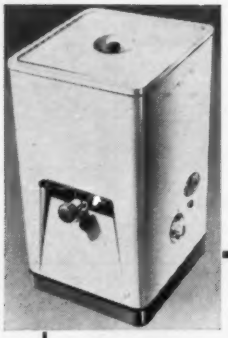

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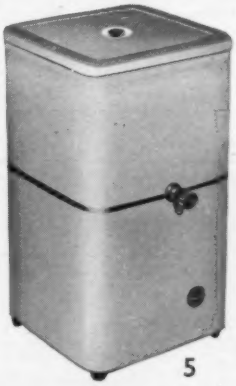

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Exterior Finish	Tub Finish	Price
Galvanised	Heavily tinned	£9 15 0
Porcelain enamelled	Tinned copper	£24 10 0
Porcelain enamelled	Tinned copper	£15 15 0
Galvanised	Tinned copper	£9 5 0
Galvanised	Tinned copper	£8 17 6
Pink and green, cream and green or all cream	Tinned copper	£14 0 0
Galvanised	Galvanised	£4 0 0
Cream or white vitreous enamel	Mottled vitreous enamel	£20 0 0
Cream or white vitreous enamel	Mottled vitreous enamel	£12 5 0
Galvanised	Tinned copper	£9 7 6
Cream or white vitreous enamel	Mottled vitreous enamel	£10 10 0
Galvanised	Galvanised	£6 10 0
Anodised aluminium	Anodised aluminium	£6 19 6
Cream enamel, with maroon or eau-de-nil fittings	Anodised aluminium	£7 7 0
Galvanised	Tinned copper	£9 7 6
Galvanised	Tinned copper	£9 15 0
White or cream with 2 tones of blue	Anodised aluminium	£12 12 0
Galvanised	Tinned copper	£19 15 0
White/red, cream/red, or cream/eau-de-nil	Tinned copper	£25 0 0

1. *Bulpitt "600" 4 gal wash boiler*
2. *Burco E.300 AS cabinet model*
3. *Amplec "CRS" round type washer*
4. *Amplec "Star-Styled" cabinet model*
5. *Brunlec "XL" cabinet wash boiler*
6. *Bradley "Beldray" 329 4½ gal boiler*
7. *Alder "XR" wash boiler*
8. *"Baby Burco" 5 gal boiler*

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Manufacturer	Name or Model	Type	Size (H.W. & D. in inches)	Tub Capacity	Wringer	Agitator	Loading	Method of Control
CHALFONT ELECTRICAL PRODUCTS, LTD., Tyrrell Street, Leicester.	"Popular"	Round	12×16 diameter	4½ gal	No	No	2 kW	Direct from plug
CO-OPERATIVE WHOLESALE SOCIETY, LTD., Hall Street, Dudley, Worcs.	"Invincible"	Round	12×16 diameter	4 gal	No	No	2 kW	Direct from plug
EASICLENE PORCELAIN-ENAMEL (1938), LTD., Darlaston, Wednesbury, Staffs.	"Easiclene"	Cabinet	28×16×16	10 gal	No	No	3 kW	3-heat switch
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.	DE4763	Round	19×27 diameter	9½ gal	No	No	3 kW	2 s.p. switches
	DE4764	Round	19×27 diameter	9½ gal	No	No	3 kW	2 d.p. switches
	DE4765 and DE4765C	Round	19×27 diameter	9½ gal	No	No	3 kW	2 d.p. switches and cut-out (a.c. only)
	DE4759	Cabinet	28×16⅝×16⅛	9½ gal	No	No	3 kW	2 d.p. switches
	DE4760	Cabinet	28×16⅝×16⅛	9½ gal	No	No	3 kW	2 d.p. switches and cut-out (a.c. only)
L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, Kingsway, London, W.C.2.	"Dinky"	Round	12×10½	2½ gal	No	No	1½ kW	—
JACKSON ELECTRIC STOVE CO., LTD., Dallow Road, Luton, Beds.	908	Cabinet	30½×17½×13	10 gal	No	No	3 kW	3-heat s.p. rotary switch
	909	Cabinet	30½×17½×13	10 gal	No	No	3 kW	2 d.p. switches and cut-out
LAMB, HINGLEY & CO., LTD., Lye, Stourbridge, Worcs.	"Apex" 436	Round	12½×15 diameter	4½ gal	No	No	2 kW	Direct from plug
	"Apex" 438	Round	25×17 diameter	10 gal	No	No	3 kW	On/off press-button switches
	"Apex" 440	Round	25×17 diameter	10 gal	No	No	3 kW	"Simmerstat" control
R. & A. MAIN, LTD., (Electrical Division), 48, Grosvenor Gardens, London, S.W.1.	"Main 55 Plus"	Cabinet	29×15½×18	10 gal	Yes (plus 9s purchase tax)	Optional extra	3 kW	Push-button switches, twin indicator lights and cut-out

9

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11

Exterior Finish	Tub Finish	Price
Galvanised	Galvanised	£3 7 6
Galvanised	Galvanised	£3 10 0
White, cream or eau-de-nil	Vitreous enamel	£15 15 0
Galvanised	Tinned	£10 5 0
Galvanised	Tinned	£10 15 0
Galvanised (4755) and enamelled (4755C)	Tinned	£11 15 0 (DE4765) £12 10 0 (DE4765C)
White or honeysuckle enamelled	Tinned	£15 15 0
White or honeysuckle enamelled	Tinned	£16 15 0
Frosted aluminium	—	£4 7 6
Enamelled all-white or all-cream or with turquoise blue or eau-de-nil table top	Tinned copper	£12 12 0
Enamelled all-white or all-cream or with torquoise blue or eau-de-nil table top	Tinned copper	£13 17 0
Galvanised	Galvanised	£3 19 6
Galvanised	Galvanised	£8 0 0
Galvanised	Galvanised	£8 15 0
Cream vitreous enamel	Grey mottled vitreous enamel	£23 19 0 or £15 17 6 (less wringer and clothes rest)

12

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9. *Chalfont "Popular" 4½ gal boiler*
10. *Lamb, Hingley "Apex" 436 4½ gal boiler*
11. *C.W.S. "Invincible" 4 gal boiler*
12. *Jackson model 908 wash boiler*
13. *G.E.C. round type wash boiler*
14. *"Main 55 Plus" cabinet boiler*
15. *G.E.C. cabinet type wash boiler*
16. *Lamb, Hingley "Apex" 438 10 gal model*
17. *Easiclene 10 gal boiler*

Manufacturer	Name or Model	Type	Size (H.W. & D. in inches)	Tub Capacity	Wringer	Agitator	Loading	Method of Control
SELECTAHEAT, Holyhead Road, Wednesbury, Staffs.	"Red Label"	Round	13×16 diameter	4½ gal	No	No	2 kW	Direct from plug. Cut-out
	"Universal"	Round	15×15 diameter	4½ gal	No	No	2 kW	Direct from plug. Cut-out
HERMAN SMITH SMITHLITE, LTD., Empire Works, Dudley, Worcs.	G.1953	Round	26×17⅞ diameter	10 gal	No	No	3 kW	3-heat rotary switch
	G.1953S.C.	Round	26×17⅞ diameter	10 gal	No	No	3 kW	3-heat kick switch and cut-out
	E.1953	Round	26×17⅞ diameter	10 gal	No	No	3 kW	3-heat rotary switch
	E.1953S.C.	Round	26×17⅞ diameter	10 gal	No	No	3 kW	3-heat kick switch and cut-out
TAYLOR & WILSON, LTD., Taywil Works, Accrington, Lancashire.	"Marvel"	Round	19½×15½ diameter	5 gal	No	No	2 kW	3-heat rotary switch
F. J. TOMLINSON, LTD., Albion Mill, Rawtenstall, Lancs.	"Handy"	Round	12×15½ diameter	4½ gal	No	No	1½ or 2 kW	Ejector safety device
TREFOREST ELECTRICAL SERVICES, LTD., Pengham Road, Aberbargoed, Bargoed, Glam.	350	Round	28½×18½ diameter	10 gal	No	Optional extra	3 kW	3-heat kick switches
	351	Round	28½×18½ diameter	10 gal	No	Optional extra	3 kW	3-heat kick switches
	352	Round	28½×19 diameter	10 gal	No	Optional extra	3 kW	3-heat kick switches
	353	Cabinet	28¾×18½×18½	10 gal	No	Optional extra	3 kW	Press-button 3-heat switch
	354	Cabinet	28¾×18½×18½	10 gal	Yes	Optional extra	3 kW	Press-button 3-heat switch
UNIVERSAL BOILERS & ENGINEERING CO., LTD., Fulledge Works, Burnley, Lancs.	RGAC	Round	28×19½ diameter	10 gal	No	No	3 kW	Rotary switch
	RGCO	Round	28×19½ diameter	10 gal	No	No	3 kW	2 foot-press switches and cut-out
	RSAC	Round	28×19½ diameter	10 gal	No	No	3 kW	Rotary switch
	RSCO	Round	28×19½ diameter	10 gal	No	No	3 kW	2 foot-press switches and cut-out
	SQAC	Cabinet	29½×16×16	10 gal	No	No	3 kW	Rotary switch
	SQCO	Cabinet	29½×16×16	10 gal	No	No	3 kW	2 foot-press switches and cut-out

18

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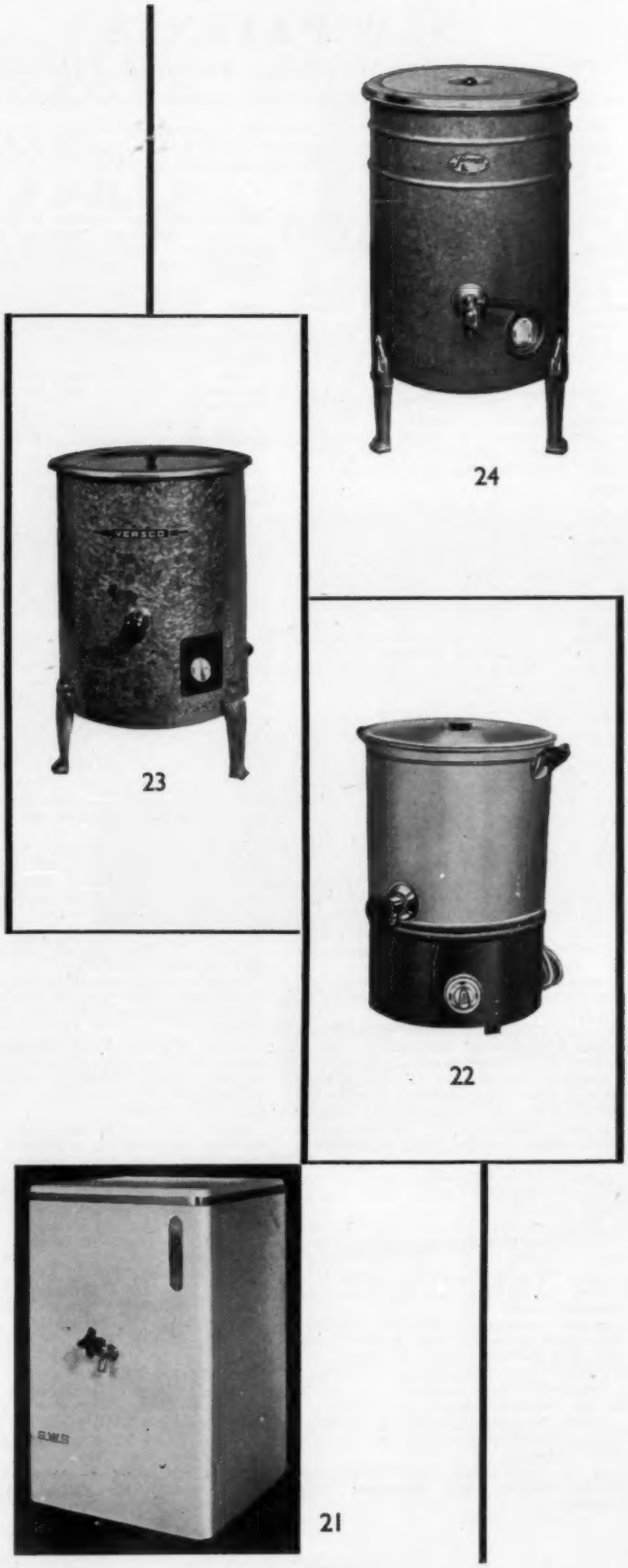
Exterior Finish	Tub Finish	Price
Galvanised or stoved enamel	Galvanised	£3 19 6
Anodised aluminium or stoved enamel	Anodised aluminium	£5 12 0
Galvanised	Tinned	£9 19 9
Galvanised	Tinned	£11 0 9
Galvanised	Tinned	£12 0 0
Stove enamelled	Tinned	£13 1 0
Cream and maroon stoved enamel	Anodised aluminium	£7 7 0
Galvanised	—	£3 11 9
Galvanised	Tinned	£10 0 0 (s.p. switches) £10 6 0 (d.p. switches) £11 5 0 (a.c. cut-out)
Cream, white, blue or red stoved enamel	Tinned	£11 10 6 (s.p. switches) £11 16 6 (d.p. switches) £12 15 6 (a.c. cut-out)
Cream, white, blue or red stoved enamel	Tinned	£12 13 6 (s.p. switches) £12 19 6 (d.p. switches) £13 18 6 (a.c. cut-out)
Cream or white stoved enamel	Tinned	£15 12 6 £16 17 6 (a.c. cut-out)
Cream or white stoved enamel	Tinned	£24 9 6 (incl. p.t. on wringer)
Galvanised	Tinned copper	£11 11 0
Galvanised	Tinned copper	£12 18 6
Stoved enamel	Tinned copper	£13 5 1
Stoved enamel	Tinned copper	£14 12 7
Stoved enamel	Tinned copper	£17 1 0
Stoved enamel	Tinned copper	£18 3 0



18. *Selectaheat "Red Label" 4½ gal boiler*
19. *L. G. Hawkins "Dinky" 2¾ gal boiler*
20. *F. J. Tomlinson "Handy" boiler*
21. *Treforest model 353 wash boiler*
22. *Taylor & Wilson "Marvel" 5 gal boiler*
23. *Universal Boilers round type boiler*
24. *Herman Smith "Smithlite" galvanised 10 gal boiler*

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) will be obtainable after 15th January from the Patent Office, 25, Southampton Buildings, London, W.C.2

1944

15584. Kanne, W. R.—Device for detecting radioactivity. 15th August, 1944. (789213.)

1953

2014. Standard Telephones & Cables, Ltd.—Storage of intelligence. 15th January, 1954. (788991.)

8154/6. National Research Development Corporation.—Electronic digital computing machines. 23rd March, 1954. (789207/9.)

34638. General Electric Co., Ltd., and Foot, J. B. L.—Panoramic radio receivers. 9th December, 1954. (789067.)

35838. Electric & Musical Industries, Ltd.—Electrode structures for thermionic valves. 10th December, 1954. (789215.)

1954

285. British Thomson-Houston Co., Ltd.—Electric discharge lamps. 29th December, 1954. (789216.)

3458. British Insulated Callender's Cables, Ltd.—Method of bringing together and moving apart the parts of an electric cable coupling and a tool for use in such method. 4th February, 1955. (789217.)

8814. Schaaf, A.—Electro-acoustic apparatus. 25th March, 1954. (789069.)

10536. British Thomson-Houston Co., Ltd.—Electrical position control means. 7th April, 1955. (789218.)

11407. Ciba, Ltd.—Organic compounds containing phosphorus, processes for their manufacture and preparations containing them. 20th April, 1954. (789122.)

11683. Lumalampan Aktiebolag.—Electrode for electric discharge tubes. 22nd April, 1954. (789071.)

11703. Staatsbedrijf der Posterijen, Telegrafie en Telefonie.—Radio-telegraph system. 22nd April, 1954. (789072.)

11829. Knowles, R. W.—Switching arrangements for controlling electrical heating apparatus. 22nd July, 1955. (789295.)

12198. Accumulatoren-Fabrik Akt.-Ges.—Positive electrodes for alkaline accumulators. 27th April, 1954. (789073.)

22050. Quarzlampen Ges.—Electric discharge lamp. 28th July, 1954. (789074.)

27827. Pye Marine, Ltd., and Soc. Générale d'Electricité et de Radio.—Submarine echo-sounding apparatus for fishing vessels. 26th September, 1955. (789225.)

30032. Westinghouse Electric International Co.—Colour modified incandescent electric lamps. 19th October, 1954. (789078.)

32382. Brennan, J. B.—Electrolytic devices. 9th November, 1954. (Addition to 680983.) (789005.)

33006. National Cash Register Co., Ltd.—Electronic arithmetic units. 29th August, 1955. (789166.)

33458. British Thomson-Houston Co., Ltd.—Winding equipment. 28th October, 1955. (788998.)

33570. English Electric Co., Ltd.—Mine winders and the like. 18th November, 1955. (789006.)

33712. International Business Machines Corporation.—Magnetic core registering system. 22nd November, 1954. (788994.)

33818. Soc. d'Electronique et d'Automatisme.—Selective transfer of electric signals. 22nd November, 1954. (789226.)

33882. National Research Development Corporation.—Electroforming. 9th January, 1956. (789227.)

35337. Early Crops, Ltd.—Tubular type electric heaters. 5th December, 1955. (789167.)

35894. Decca Record Co., Ltd.—Carrier demodulators. 7th December, 1955. (789168.)

37759. Allmänna Svenska Elektriska Aktiebolaget.—Control equipment for copying machine tools. 31st December, 1954. (789298.)

1955

543. Telephone Manufacturing Co., Ltd.—Electromagnetic relays. 3rd January, 1956. (789083.)

1190. Gulton Mfg. Corporation.—Ceramic ferroelectric bodies. 14th January, 1955. (789084.)

2955. Plessey Co., Ltd.—Electrical information storage apparatus. 1st May, 1956. (789012.)

3893. British Thomson-Houston Co., Ltd.—Winders, hoists and the like. 24th January, 1956. (788999.)

7211. English Electric Co., Ltd.—Position indicating systems for winder, hoist, or like equipments. 8th March, 1956. (789013.)

7963. Philips Electrical Industries, Ltd.—Frequency discriminators and phase discriminators. 18th March, 1955. (789087.)

11546. Philips Electrical Industries, Ltd.—Stud welding gun having stud locating means. 3rd February, 1956. (789231.)

12700. Dale, A. B., and South, R. H.—Electrical resistors. 2nd May, 1956. (789129.)

15127. General Electric Co.—Electric speed control systems for power plants. 25th May, 1955. (789304.)

15407. Ford Motor Co., Ltd.—Resistance welding. 27th May, 1955. (789132.)

16208. British Thomson-Houston Co., Ltd.—Luminescent materials. 4th June, 1956. (789237.)

16850. General Electric Co., Ltd.—Nuclear reactors. 8th June, 1956. (789022.)

19986. Philips Electrical Industries, Ltd.—Methods of sealing glass envelopes in the barrier layer rectifier devices. 11th July, 1955. (789286.)

20240. Stephen, R. A.—Electroscopes. 13th July, 1956. (789185.)

20371. Allmänna Svenska Elektriska Aktiebolaget.—Assembly of stacked series-connected impedance units. 14th July, 1955. (789097.)

20769. Dubois, R. C.—Electromagnetic valve. 18th July, 1955. (789241.)

21275. Philips Electrical Industries, Ltd.—Method of producing magnetic cores. 22nd July, 1955. (789099.)

24757. Sangamo Weston, Ltd.—Magnetic converter apparatus for measuring d.c. currents. 29th August, 1955. (789244.)

25604. Babcock & Wilcox, Ltd.—Installations for the absorption of heat from gases generated under pressure. 7th September, 1955. (789246.)

26459. Compagnie Industrielle des Piles Electriques.—Primary cells. 15th September, 1955. (789248.)

27040. Automatic Telephone & Electric Co., Ltd.—Telephone systems. 30th August, 1956. (789142.)

28408. General Electric Co.—Apparatus for making electronic tubes and the like. 5th October, 1955. (789103.)

28972. Wipac Development, Ltd.—Permanent magnet alternators. 25th September, 1956. (789031.)

29409. Duss, F.—Portable electric tools. 14th October, 1955. (789189.)

29505. Berchtold, J.—Process for photo-electric reproductions and apparatus therefor. 17th October, 1955. (789309.)

31697. United Kingdom Atomic Energy Authority.—Fuel elements for nuclear reactors. 25th October, 1956. (789257.)

32947. Philips Electrical Industries, Ltd.—Driving arrangements comprising a cord drum, more particularly for use in wireless receivers. 17th November, 1955. (789259.)

33032. Gilbert & Barker Manufacturing Co.—Electronic level-sensitive apparatus. 18th November, 1955. (789191.)

33836. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Methods and apparatus for condensing and/or rectifying mixtures. 25th November, 1955. (789260.)

34910. Standard Telephones & Cables, Ltd.—Telegraph exchange systems. 15th January, 1954. (Divided out of 788991.) (788992.)

34911. Standard Telephones & Cables, Ltd.—Number comparators. 15th January, 1954. (Divided out of 788991.) (788993.)

35257. Ateliers de Constructions Electriques de Charleroi.—Sound recording and reproducing apparatus. 8th December, 1955. (789195.)

35407. Westinghouse Electric International Co.—Electric circuit interrupters. 9th December, 1955. (789262.)

36524. Deutsche Edelstahlwerke Akt.-Ges.—Method of and apparatus for the electrical resistance heating of semi-finished metallic articles. 20th December, 1955. (789037.)

36967. Papst, H.—Rotating field motors. 23rd December, 1955. (789038.)

1956

551. British Thomson-Houston Co., Ltd.—Cooling systems for high temperature turbines. 6th January, 1956. (789197.)

983. Ateliers de Constructions Electriques de Charleroi.—Sound recording and reproducing apparatus. 11th January, 1956. (789040.)

2526. Oldham & Son, Ltd., and Prout, L. R.—Electric batteries. 24th October, 1956. (789266.)

5646. Soc. Anon. de Telecommunications.—Two-way two-wire telephone repeaters. 23rd February, 1956. (789270.)

10268. Mallory & Co., Inc., P. R.—Primary cells. 4th April, 1956. (789052.)

13780. Bosch Ges., R.—Method of manufacturing a field casing for a dynamo-electric machine. 4th May, 1956. (789278.)

15380. Westinghouse Electric International Co.—Electric circuit interrupters. 17th May, 1956. (789056.)

19851. Allmänna Svenska Elektriska Aktiebolaget.—Protective means for a group of capacitors in an electrical power system. 27th June, 1956. (789159.)

21930. Stichting Reactor Centrum Nederland.—Nuclear reactors. 16th July, 1956. (789117.)

23726. Batchellor, J. R. (Akt.-Ges. Brown, Boveri & Cie.).—Electrical resistors. 1st August, 1956. (789290.)

31012. General Electric Co.—A.c. motors. 11th October, 1956. (789292.)

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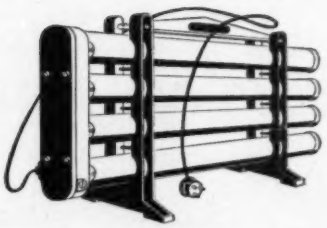

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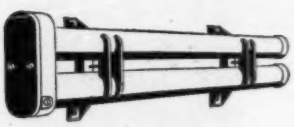

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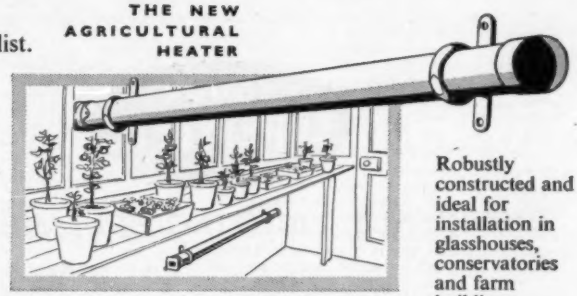

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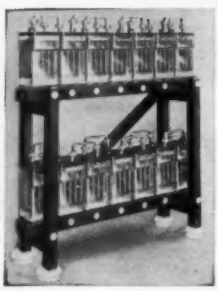

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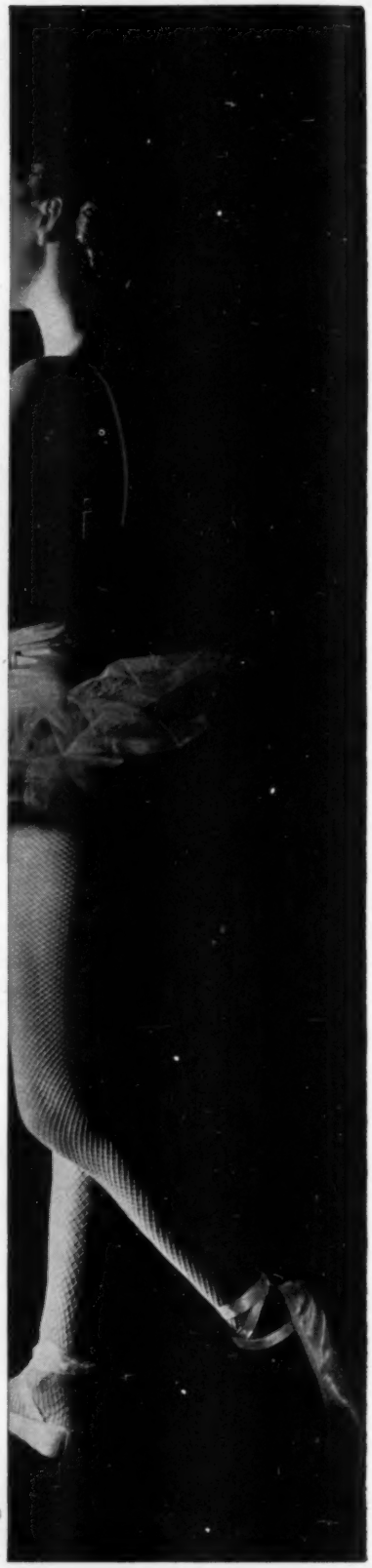

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NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Monday, 13th January

BELFAST.—Queen's University, 7.30 p.m. I.E.E. Northern Ireland Centre. "Engineering Education in the Soviet Union," by P. E. Sleight and Prof. E. Giffen. (Joint meeting with the Northern Ireland Association of the I.C.E. and the Northern Ireland Branch of the I.Mech.E.)

BIRMINGHAM. — College of Technology, 6 p.m. I.E.E. South Midland Supply and Utilisation Group. "Electricity in Modern Commercial Horticulture," by C. A. Cameron Brown and A. W. Gray.

BRISTOL.—University Engineering Laboratories, 6 p.m. I.E.E. Western Centre. "The B.B.C. Sound Broadcasting Service on Very-High Frequencies," by E. W. Hayes and H. Page.

LEEDS.—Hotel Metropole, 7 p.m. Institution of Production Engineers, Leeds Section. "Correct Application of Electrical Equipment to Production Machinery," by W. L. Sims.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers, informal meeting. Discussion on "The Use of Electricity in the Garden by Amateurs," opened by M. M. Harvey.

White Hall Hotel, Bloomsbury Square, W.C.1, 6.30 p.m. A.S.E.E. Central London Branch. "Diesel Engines as Applied to Electrical Practice," by H. A. Gill.

MALVERN.—Winter Gardens. I.E.E. South Midland Centre. District meeting. "The Importance of Research in Hearing and Seeing to the Future of Telecommunication Engineering," by E. C. Cherry.

NEWCASTLE-UPON-TYNE. — Neville Hall, 6.15 p.m. I.E.E. North-Eastern Centre. "Earthing of Low- and Medium-Voltage Distribution Systems and Equipment," by F. Mather.

STAFFORD. — Technical College, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "Mechanical Strength of Power Transformers in Service," by E. T. Norris.

WEMBLEY PARK.—Century Hotel, Forty Avenue, 8.15 p.m. A.S.E.E. North West London Branch. 1957 Electrical Engineers (A.S.E.E.) Exhibition Film, presented by P. A. Thorogood.

Tuesday, 14th January

ARBORFIELD. — Assembly Hall, 3 (Tels) Training Bn., R.E.M.E., 7 p.m. I.E.E. London Graduate and Student District meeting. "Transistor Amplifier Circuits," by W. A. Thorpe.

BEDFORD.—Swan Hotel, 7.15 p.m. I.E.E. District meeting. "The Development of Variable-Speed High Power Drives for Large Wind Tunnels" and "A Variable Frequency Power Installation for Large Wind-Tunnel Drives," by P. McKearney, L. S. Drake and E. G. Mallalieu. "Speed Control of Large Wind Tunnels with particular reference to the R.A.E. 8ft × 8ft High-Speed Wind Tunnel," by L. S. Drake, J. A. Fox and G. H. A. Gunnell. "Automatic Setting of the Flexible Walls of a Large Wind Tunnel," by T. Barnes and C. R. Dunham.

COVENTRY. — Coventry Electricity Sports and Social Club, Merrick Lodge, St. Nicholas Street. Coventry Electric Club. "Earth Leakage Protection of Domestic and Industrial Installations," by J. A. Robbins.

EDINBURGH.—Scottish Lyceum Gallery and Restaurant, 11, Atholl Crescent, 7.30 p.m. Edinburgh Electrical Society. "Development of Electricity Supplies in Rural Areas," by J. B. McPherson.

LEEDS.—C.E.A. Offices, 1, Whitehall Road, 7 p.m. I.E.E. North Midland Graduate and Student Section. Main Centre chairman's address, by A. J. Coveney.

LONDON.—At the Federation of British Industries, 21, Tothill Street, S.W.1, 6 p.m. Illuminating Engineering Society. "Lighting of Aircraft Flight Decks," by J. W. Strange and B. Stevens.

Connaught Rooms, W.C.2, 12.30 for 1 p.m. Electrical Industries Club. Luncheon. Guest speaker, Colin Cowdrey.

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Utilisation Group. "Recent Developments in Low-Voltage High-Rupturing-Capacity Fuse Links," by R. H. Dean.

Engineers' Club, Albert Square, 7.15 p.m. Incorporated Plant Engineers, Manchester Branch. "Plastics in Industry."

PORTSMOUTH. — Wiltshire Lamb Hotel, 7.30 p.m. A.S.E.E. Portsmouth Branch. "Nuclear Generation," by A. L. Shaw.

SWANSEA. — Department of Metallurgy, University College, 6.30 p.m. Institute of Metals, South Wales Local Section. "Electron Microscopy," by Dr. J. W. Menter.

WORKINGTON.—College of Further Education, 7 p.m. I.E.E. North-Eastern Centre. District meeting. "Earthing of Low- and Medium-Voltage Distribution Systems and Equipment," by F. Mather.

YORK.—Royal Station Hotel, 7.30 p.m. A.S.E.E. York Branch. "Electronic Instruments," by Messrs. Perkins and Smith.

Wednesday, 15th January

BRIGHTON.—Technical College, 6.30 p.m. I.E.E. Southern Centre. "The B.B.C. Sound Broadcasting Service on Very-High Frequencies," by E. W. Hayes and H. Page.

GLASGOW.—At the Institute of Engineers and Shipbuilders in Scotland, Elmbank Crescent, 8 p.m. A.S.E.E. Glasgow Branch. "Portable Electric Tools," by A. R. Graydon.

LONDON.—Café Royal. I.E.E. Utilisation Section. Section dinner-dance.

I.E.E. London Graduate and Student Section. Visit to Tate & Lyle, Ltd., Silvertown, E.16 (at 2 p.m.).

17, Belgrave Square, S.W.1, 6.30 p.m. Institute of Metals. "The Mechanism of Clustering and Precipitation in Metals," by Dr. D. Turnbull.

Institute's House, 47, Belgrave Square, S.W.1, 6 p.m. Institute of Physics, London and Home Counties Branch. "Physical Research in the Research Group of the Atomic Energy Authority," by Dr. B. F. J. Schonland.

ROCHESTER. — King's Head Hotel, High Street, 7 p.m. Incorporated Plant Engineers, Kent Branch. "Some Notes on Boiler Inspection and Insurance."

RUGBY.—Temple Speech Room, 7.30 p.m. I.E.E. Rugby Sub-Centre. Faraday Lecture. "The Electrification of the British Railways," prepared by the late G. H. Fletcher and presented by R. Ledger.

Thursday, 16th January

BIRMINGHAM.—Grand Hotel, Colmore Row, 6.45 for 7.15 p.m. Institute of Metal Finishing. Annual Midland dinner and dance.

BLACKBURN. — Lecture Hall, 7.30 p.m. Incorporated Plant Engineers, Blackburn Branch. "Fuel and Power Policy," by G. Nabarro, M.P.

CARDIFF.—Park Hotel, 6.30 for 7 p.m. South Wales Institute of Engineers. Annual dinner.

HULL.—Yorkshire Electricity Board, Ferensway, 6.30 p.m. I.E.E. North Midland Centre. Chairman's address, by A. J. Coveney.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilisation Section. "Recent Developments in Low-Voltage High-Rupturing-Capacity Fuse Links," by R. H. Dean.

A.S.E.E. South West London Branch, 5.30 p.m. Visit to the Post Office Cable and Wireless Service, Electra House, Victoria Embankment.

Caxton Hall, S.W.1, 2.30 p.m. Diesel Engineers' and Users' Association. "Development and Maintenance of Marine Diesel Engines," by A. G. Arnold.

MAIDSTONE.—Royal Star Hotel, 7.30 p.m. A.S.E.E. Kent Branch. Members' lecturettes.

MANCHESTER. — Demonstration Theatre, N.W.E.B., Town Hall, 6 p.m. I.E.S. Manchester Centre. "The Use of Coloured Light," by H. Hewitt.

Friday, 17th January

BIRMINGHAM. — Imperial Hotel, Temple Street, 7.30 p.m. Incorporated Plant Engineers, Birmingham Mobile Plant Discussion Group. "Fuel Injection," by T. G. Charlesworth.

IRELAND.—I.E.E. Irish Branch. Discussion on "The Education of Technologists and Technicians for the Electrical Industry," introduced by Dr. Willis Jackson.

LEEDS.—Queens Hotel. Incorporated Plant Engineers, West and East Yorkshire Branch. Dinner-dance.

Saturday, 18th January

OXFORD.—Clarendon Laboratory, 7 p.m. A.S.E.E. Oxford, Reading and Districts Branch. "Research at the Clarendon Laboratory."

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 18th January:—

VIBROTO. No. 767,851. Class 7. Portable electrically-driven machine tools and tools for use therewith for drilling, grinding, sanding, blowing, brushing, polishing, filing, sawing, screwdriving and nut-setting.—Rawlplug Co., Ltd., Rawlplug House, Cromwell Road, South Kensington, London, S.W.7.

MALLORY. No. 765,169. Class 9. Electric batteries and electric dry cells.—Mallory Batteries, Ltd., Rainham Works, Rainham Road South, Dagenham, Essex.

SIMTROL. No. 768,731. Class 9. Electric automatic regulating apparatus for controlling the temperature of heating appliances and parts. — "Diamond H" Switches, Ltd., Gunnersbury Avenue, London, W.4.

ANODAL. No. B768,877. Class 9. Electric fuse wire and electric cables. — British Aluminium Co., Ltd., Norfolk House, St. James's Square, London, S.W.1.

No. 769,966 (design). Class 9. Scientific, electric and electronic apparatus and instruments; weighing, measuring, signalling and checking (supervision) apparatus and instruments; and parts.—Regula-Projekt, Narodni Podnik, Prague, Czechoslovakia. Address for service, c/o Reddie & Grose, 6, Bream's Buildings, London, E.C.4.

Catalogues and Lists

CONDUIT.—Leaflet giving particulars of "Burcol" p.v.c. covered conduit, and fittings for use with this tubing.—**LaBurn, Ltd.**, Burcol Works, Radway Road, Shirley, Warwicks.

ELECTRICAL PRECIPITATORS.—24-page illustrated catalogue (69) dealing with the "Holmes-Elex" electrical precipitators.—**W. C. Holmes & Co., Ltd.**, Gas Cleaning Division, Turnbridge, Huddersfield.

RELAYS.—Folder containing literature on the range of "G-V" thermal relays supplied by the company.—**Mercia Enterprises, Ltd.**, Godiva House, Allesley Old Road, Coventry.

TRANSFORMER BOBBINS. — 16-page illustrated catalogue of the "Lantex" range of transformer bobbins.—**Langley, London, Ltd.**, Kelvin Way, Crawley, Sussex.

VOLTAGE STABILISERS. — Leaflet giving advance information on an addition to the company's range of rack-mounted automatic voltage stabilisers.—**Claude Lyons, Ltd.**, 76, Oldhall Street, Liverpool, 3.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Australia.—Sydney County Council. 16th January. 11,000 V, 250 MVA metalclad switching equipment. (E.S.B. 31276/57. Ten/30067.)*

Electricity Commission of New South Wales, Sydney. 28th January. Two 13·8/3·56 kV, 9 MVA transformers for Tallawarra power station. (E.S.B. 31185/57. Ten/30065.)*

Barking.—Borough Council. 5th February. Vehicle batteries for one year from 1st April. Borough engineer and surveyor, Town Hall.

Birkenhead.—Borough Council. 20th January. Electrical equipment for one year to 31st March, 1959. General manager, Municipal Transport Department, Laird Street.

Burnham-on-Sea.—U.D.C. 25th January. Street lighting equipment. G. Harvey Mayhew, engineer and surveyor, Manor House.

Canada.—City of Winnipeg Hydro-Electric System. 20th January. One 15 MVA transformer. (E.S.B. 31039/57. Ten/30120.)*

Manitoba Hydro-Electric Board. 21st January. A.c. network analyser board. (E.S.B. 31030/57. Ten/30142.)*

Colombia.—El Departmento de Pedidos al Exterior. 25th January. Cables and terminal blocks. (E.S.B. 31199/57. Ten/30053.)*

Gillingham (Kent).—Borough Council. 20th January. Electric switches and accessories, conduit, wire, cables and accessories, and electric lamps, for one year from 1st April, 1958. Borough engineer, Municipal Buildings.

Greece. — Public Power Corporation, Athens. 21st January. 15 kV copper aerial cable. (E.S.B. 31732/57. Ten/30141.)*

Huddersfield. — Borough Council. 28th January. Electric lamps and electric cables for the year ending 31st March, 1959. Borough engineer and surveyor, High Street Buildings.

India.—Rajasthan Government Electrical and Mechanical Department, Jaipur. 28th February. Transformers, switchgear and equipment for substations. (E.S.B. 31211/57. Ten/30061.)*

Government of Andhra Pradesh Electricity Department, Kurnool. 22nd January. Eleven 1,500 kVA, 33/11 kV transformers. (E.S.B. 31524/57. Ten/30105.)*

Damodar Valley Corporation, Calcutta. 30th January. Passenger elevator for Durgapur power station. (See this issue.)

Iraq.—Iranian State Railways, Teheran. 9th February. Sixty diesel engine generators. (E.S.B. 31186/57. Ten/30069.)*

King's Lynn.—Borough Council. 22nd January. Electric lamps and electrical sundries for one year ending 31st March, 1959. H. G. Ridler, borough engineer, Clifton House, 17, Queen Street.

Korea.—Government Office of Supply, Seoul. 31st January. Telecommunication equipment. (E.S.B. 30765/57.I.C.A. Ten/30023.)*

Lichfield.—City Council. 7th February. Street lighting equipment. (See this issue.)

New Zealand.—Christchurch Electricity Department. 4th February. Multi-core cable. (E.S.B. 31531/57. Ten/30098.)* Storage batteries. (E.S.B. 31532/57. Ten/30099.)*

G.P.O., Wellington. 24th February. Rubber cased electric torches. (E.S.B. 31578/57. Ten/30116.)*

Northampton.—Corporation. 12th February. Re-wiring at Central Museum. (See this issue.)

Roxburgh.—County Council. 30th January. Street lighting equipment. (See this issue.)

South Africa.—Stores Department, South African Railways, Johannesburg. 17th January. Transmission line material. (E.S.B. 30873/57. Ten/30013.)*

Union Tender and Supplies Board, Pretoria. 23rd January. Telephone equipment. (E.S.B. 31374/57. Ten/30084.)* 30th January. Telephone switchboard spares. (E.S.B. 31375/57. Ten/30086.)* 6th February. V.h.f. radio link equipment. (E.S.B. 31379/57. Ten/30091.)*

Swansea.—Borough Council. 23rd January. Electric cable for street lighting, electric lamps, and public lighting equipment, for one year from 1st April, 1958. Borough engineer, Guildhall.

West Riding. — County Council. 20th January. Street lighting equipment. (See this issue.)

Wigton.—R.D.C. 10th February. Street lighting equipment. (See this issue.)

Winchester.—City Council. 20th January. Electric lamps for one year to 31st March, 1959. City engineer, The Guildhall.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Bedford.—Three 12-storey blocks; F. W. Dawkes, borough engineer, Newnham House, Horne Lane.

Billericay.—Houses (149), Outwood Common, for Walthamstow B.C.; borough engineer, Town Hall, Forest Road, E.17.

Billingham-on-Tees. — Four-storey office block, Haverton Hill Road; British Titan Products, Ltd

Birmingham.—County secondary technical school, Tile Cross, and primary school, Ladywood; E. L. Russell, chief education officer.

Shops and maisonnettes, New Road, Rubery; Joseph Webb, Ltd., builders, 1, Ivy House Lane, Coseley.

Blandford Forum.—Garage, workshops, showrooms, etc., St. Leonards Road corner site; R. E. Evans, The Damory Oak, Blandford Forum, Dorset.

Brackley.—Extensions to Magdalen College School (£48,835); county architect, County Offices, Guildhall Road, Northampton.

Elstree.—Office block adjoining Council Offices, Boreham Wood; D. Howell, R.D.C. surveyor, Shemley Road, Boreham Wood, Herts.

Gateshead.—Additions to Gateshead Grammar School (£113,000); G. F. Winters, borough engineer.

Jarrow.—New laboratory; Shell Mex & B.P., Ltd., Jarrow.

Dairy for processing and bottling of milk for Jarrow and Hebburn Co-operative Society; C.W.S. Architects' Department, 90, Westmorland Road, Newcastle-on-Tyne.

Lanchester.—Houses (20), Burnhope, for R.D.C.; direct labour.

Leeds.—Showrooms, Briggate; Freeman, Hardy & Willis, Ltd., Crown Buildings, Walnut Street, Leicester.

Middlesbrough.—Medical officers' hostel at Middlesbrough General Hospital (£12,000); chief architect, Newcastle Hospital Board, Benfield Road.

Meat warehouse, Snowdon Road, for A. G. Schellenberg; A. J. Elder, architect, 65, Albert Road.

Manchester.—Clinics at Civic Centre and Hall Lane, Wythenshawe; city architect, P.O. Box 488, Town Hall.

Northampton.—Y.M.C.A. residential hostel, Cheyne Walk; Robert Marriott, Ltd., builders, Rushden, Northants.

Northumberland.—Additions to Glendale Secondary School, Thropton County Primary School, Amble Secondary School, Annitsford Primary School, Bebside Secondary School, Forest Hall Secondary School, Shiremoor Boys' and Girls' Secondary Schools; county architect, County Hall, Newcastle-on-Tyne.

Oxford.—Secondary school, Cheney Lane and Gipsy Lane; Lavender, McMillan, Ltd., builders, 54, Cheam Common Road, Worcester Park.

Plymouth.—Office block; Tecalemit, Ltd., Marsh Mills, Forder Valley Road.

Operating theatre, South Devon and East Cornwall Hospital; Easton & Robertson, architects, 53, Bedford Square, London, W.C.1.

Prudhoe-on-Tyne.—Two extension schemes at Prudhoe and Monkton Hospital for Newcastle Hospital Board (£370,000); R. C. Williamson, Ltd., contractors, Station Works, Rowlands Gill, Co. Durham.

Rainham.—Factory, Ferry Lane; Murex, Ltd., metallurgists and refiners, Murex Works, Rainham.

Houses (44), Phillips Road; Essex Construction Co., Ltd., Whybridge Farm.

Richmond (Yorks).—Home for 50 aged and disabled persons and staff on site of Richmond House (£64,500); North Riding county architect, County Hall, Northallerton.

Ripley.—Secondary modern school on site off Steam Hill Lane (£175,000); county architect, St. Mary's Gate, Derby.

Rochdale.—Houses (100), Thrum Hall estate; borough surveyor, Town Hall.

Shepshed.—Houses (20), Glenmore estate (£30,140); Council's architect, Shepshed, Leics.

Smethwick.—Special school, Arden Road; borough engineer, Council House, Smethwick, 40.

Stalybridge.—New works; Gripfast Engineering Co., Ltd., Rope Walk, Ridge Hill.

Stamford.—Central laundry at Stamford and Rutland Hospital for East Anglian Regional Hospital Board (£28,805); Jellings-Brudenell, Ltd., 174-6, Cromwell Road, Peterborough.

Secondary modern school, Empingham Road; Edward Craven, architect, 3, St. Mary's Place.

Stirling.—Three-storey extension to Council offices; county architect, Viewforth, Stirling.

Stockton-on-Tees.—Houses on 20 acres of land at Green House Farm; Moorhouse & Barker, Ltd., builders, Thornaby Road, Thornaby-on-Tees.

Stoke Poges.—Houses, bungalows and flats (200); Muskett & Co., Avenue Lodge, Bounds Green Road, London, N.22.

Swansea.—Works extensions for Unit Superheater & Pipe Co.; Bennett Bros., Ltd., contractors, Heathfield Works, Carlton Terrace.

West Hartlepool.—Houses (44), Seaton Carew; A. G. Sinclair, borough architect.

Whickham (Co. Durham).—Houses (94), Sunniside, for U.D.C.; William Leech, Ltd., builders, Clayton Street, Newcastle-on-Tyne.

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

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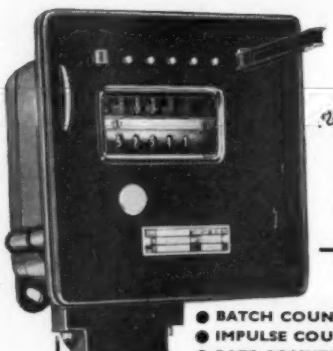

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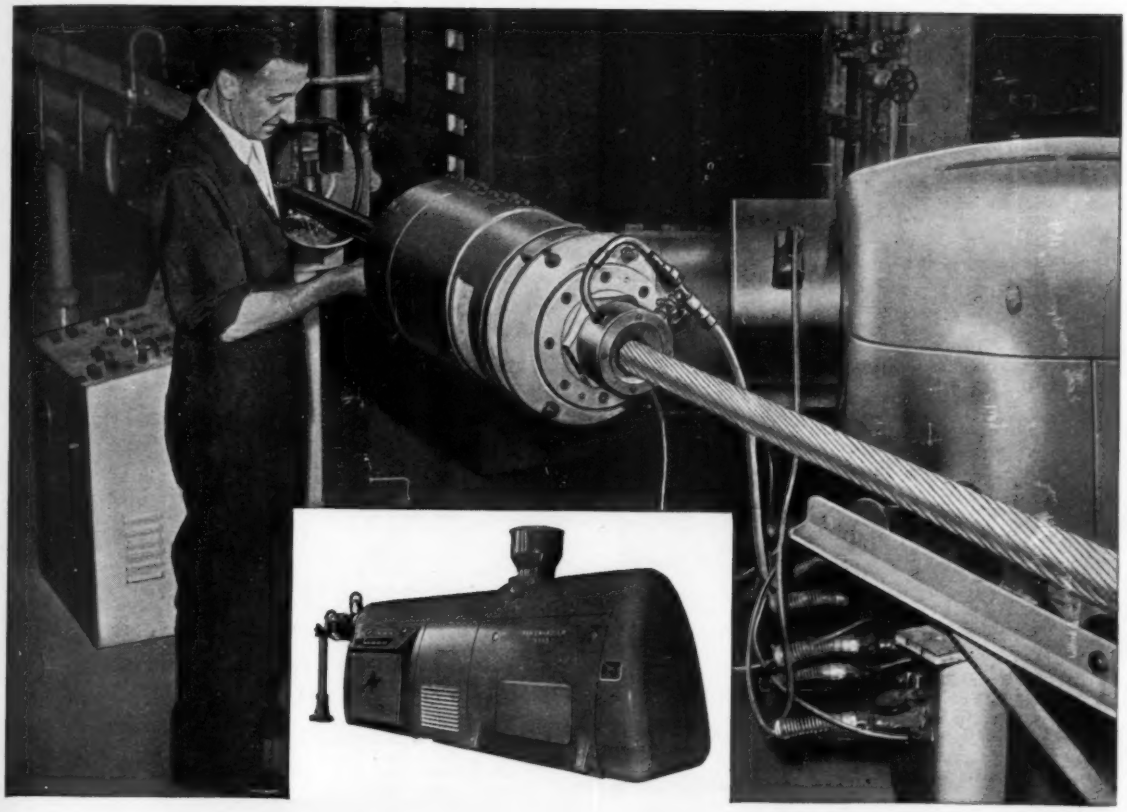

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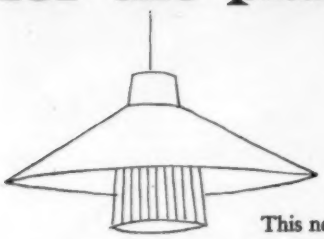

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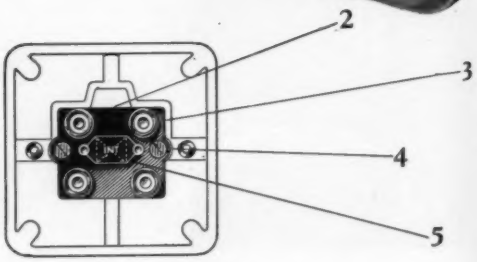

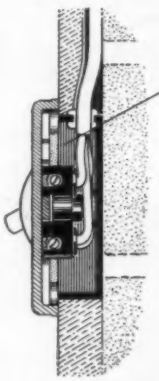

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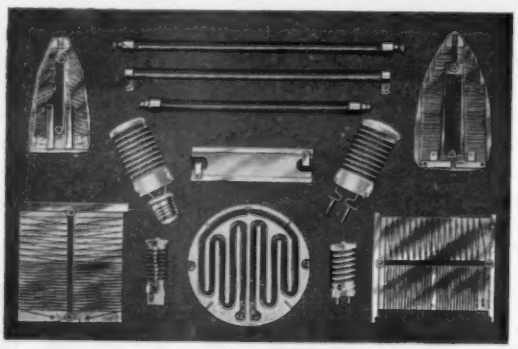

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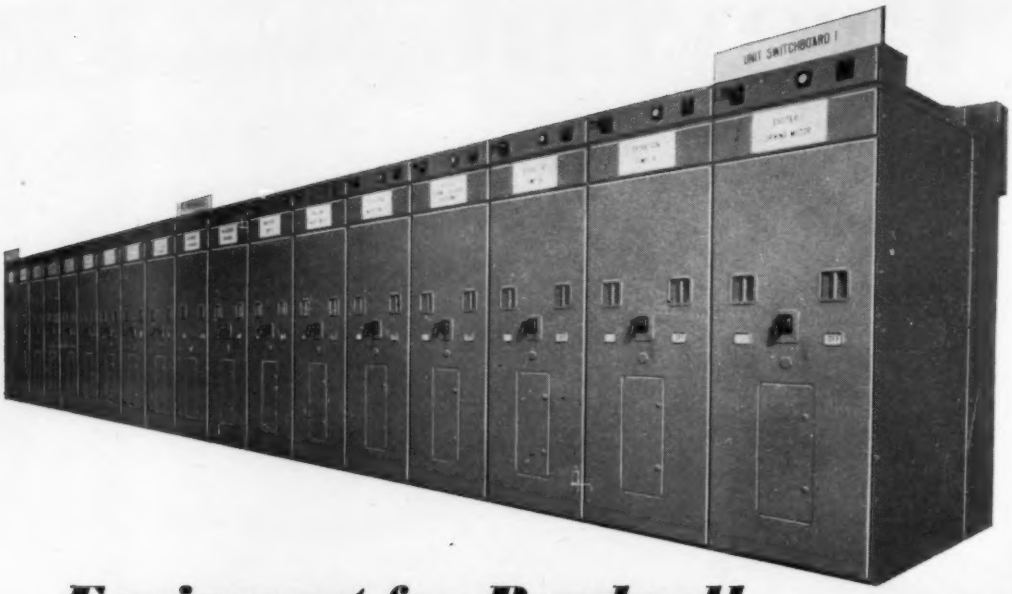

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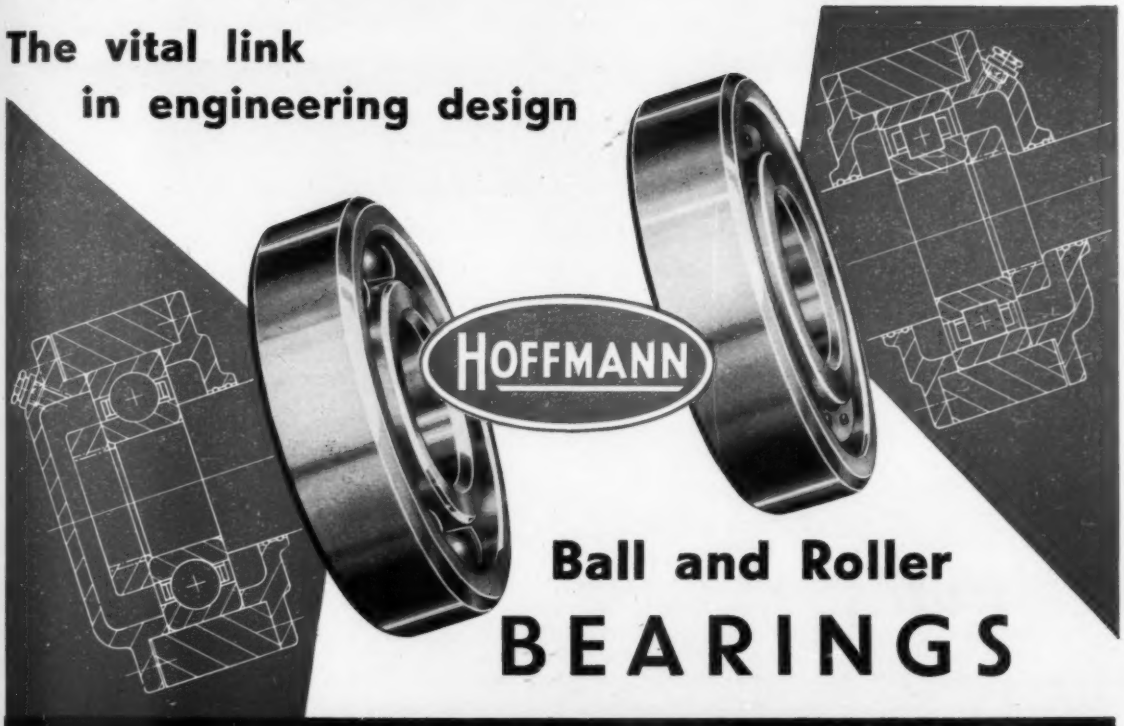

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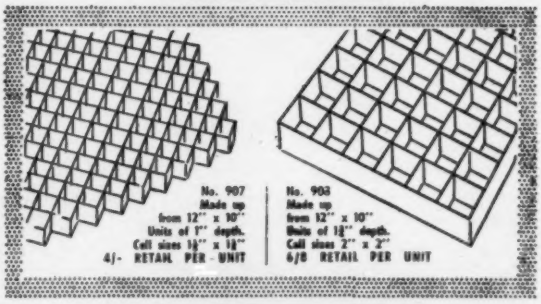
TAILOR MADE PLASTIC LOUVRES! REDUCED PRICES! PROMPT DELIVERIES!



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LUMITRON LTD.,
LIGHTING FITTING MANUFACTURERS
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COVent Gdn. 0126/7

The famous Avometers are possibly the most widely used instruments of their type in the World and have an excellent record of service under all climatic conditions, even at arctic temperatures. In tropical climates, however, there is a constant risk of derangement due to humidity, heat, and the development of fungoid growths. To meet these conditions, the manufacturers of Avometers have produced special types known as Models 7X, 8X and 8(S)X, which are suitable for continuous use in any extremes of heat or cold. In these instruments, certain components are potted in Araldite epoxy resin, which has the advantages of remarkable adhesion to metals, ceramics, etc., good dielectric properties, low shrinkage, resistance to moisture and extremes of climate, and complete freedom from micro-biological attack.

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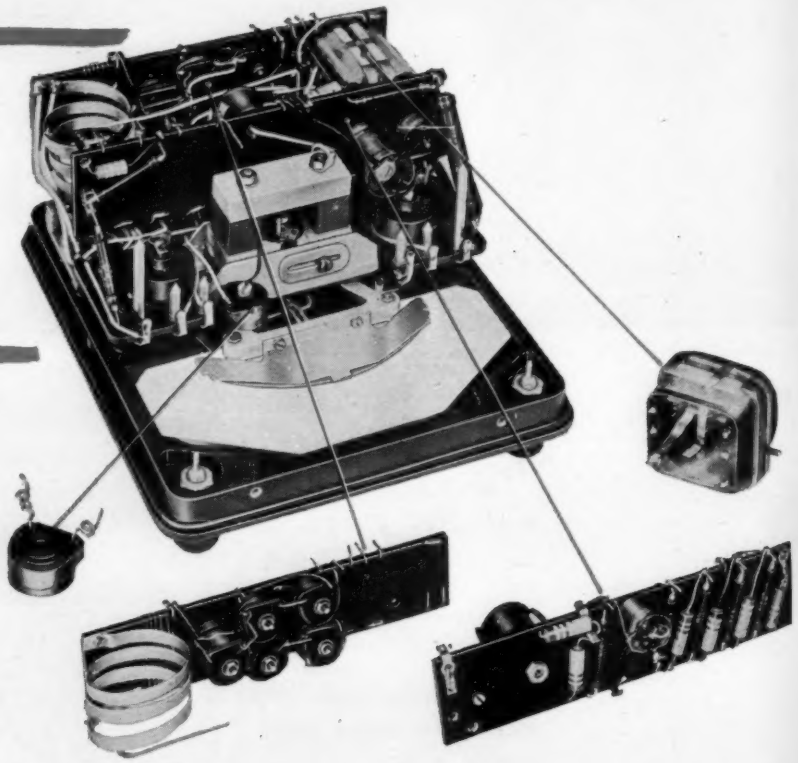

Araldite epoxy resins have a remarkable range of characteristics and uses.

They are used

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- ★ **for impregnating, potting or sealing electrical windings and components**
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- ★ **as fillers for sheet metal work**
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Araldite *epoxy resins*

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a HEATED Spin Dryer..

greatest development since spin drying began

Like all spin dryers, the Thermair spins excess moisture from the washing.

Unlike other spin dryers, the Thermair also circulates heated air through the washing, drying it *really* ready for ironing—drying it ready for use if desired.

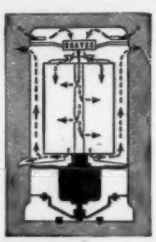
First with heat, the Thermair sets the pattern for spin dryers of the future. To get clothes really dry you need a Thermair.

The Thermair is quiet and stable, because of an entirely new principle—gyroscopic centring. It's capacious, because you can fill it to the top, packing in about 25% more washing than with most. It's safe, because the clothes are totally enclosed and the spinner automatically brakes when the lid is raised.

The Thermair, retailing at 43 *guineas, is going to mean big business for you. We are telling housewives that they can pick the rainiest day to do their washing—that the Thermair brings sunshine and a good drying breeze right into the kitchen, whatever the weather. No more wringing, no more broken buttons, no more pegging out, no more weather worries. That, you'll agree, is a good* 43 *guineas worth. The first spin dryer with heat is going to sweep the market. May we suggest you send for more details before the demand builds up ?*

Thermair

FIRST WITH HEAT SPIN DRYER



See how the air is first warmed, then circulated through the spinning clothes to make them really dry.

(Patents applied for.)

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ASTRAL ADAPTABLE BOXES

INTERIOR VIEW

British Made.
Patent Nos. 602,721 & 729,486

RANGE Thirty-five sizes of 'Astral' Adaptable Boxes. For conduit installations, and to enclose controls, switches, relays, test racks, terminals etc. Of unique strength, quality and utility. For each size of 'Astral' Box, three types of Steel Covers, each secured by four corner screws.

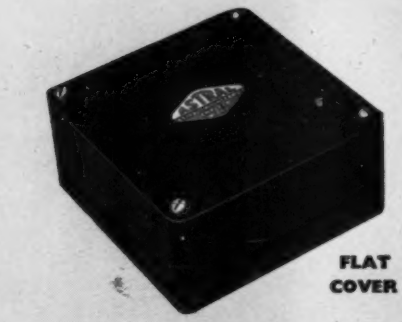
USE OF BOX	TYPE OF COVER	GAUGE OF COVER
SURFACE	'FLAT'	AS OF BOX
FLUSH	'FLAT OVERLAPPING'	14 B.G.
SURFACE, OUTDOOR OR DUSTY ATM. ETC.	'WEATHERPROOF' (Rubber Gasket)	16 B.G.

FEATURES Reinforced corners. Smooth inner and outer walls, of uniform thickness, facilitating drilling, threading, bushing, and fixing of attachments. No knockouts or holes. For heavy duty and reliable service.

MATERIALS Two small Boxes diecast in LM6 aluminium alloy, 3″ x 3″ x 1½″ deep and 2″ deep. Thirty-three Boxes of formed sheet steel, 14 B.G. (0.078″) for 4″ x 4″ x 2″ deep to 6″ x 4″ x 4″ deep, and 12 B.G. (0.099″) for the larger Boxes up to 12″ x 12″ x 4″ deep.

FINISHES All 'Astral' Adaptable Boxes and Covers are supplied stove enamelled black. Alternatively, the Steel Boxes and Covers up to 6″ x 6″ x 4″ deep, can be supplied hot dip galvanized, and larger sizes zinc sprayed, or any size cadmium plated or Sherardized.

'ASTRAL' SERVICE Adaptable Box Publication No. 51, Dimensional Drawing M.5120, Price List and a Sample Box, will be sent with pleasure. Other 'Astral' Products include Fused Switchgear, Terminal Units, Switchboards etc. Your 'Astral' Technical Representative offers personal service.



FLAT COVER

FLAT OVERLAPPING COVER

WEATHERPROOF COVER

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ASTRAL SWITCHGEAR LIMITED
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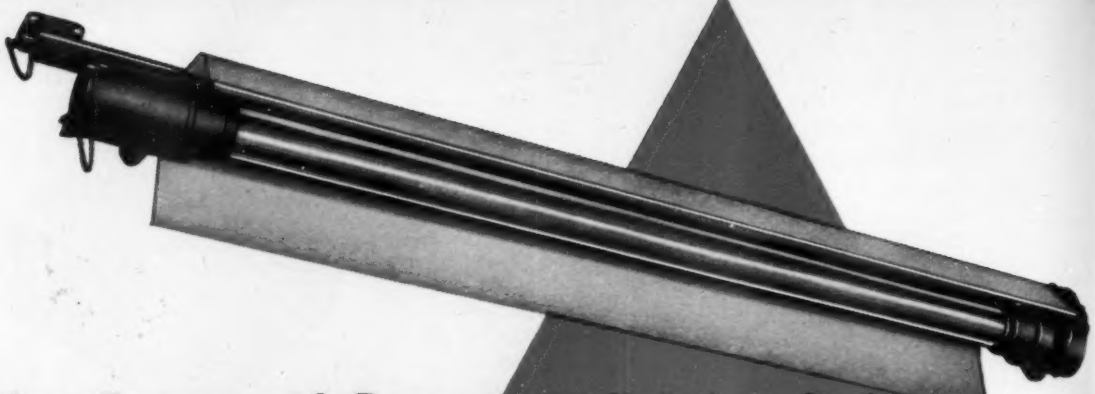

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unique!

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Fittings in twin 2 ft. 40w, and single or twin 4 ft. 40w and 5 ft. 80w assemblies

to BSS 229 & 889

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covering groups II & III gases

Solar Prominences — among the phenomena under observation by scientists of more than 50 nations throughout the International Geophysical Year.
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the hazard . . the shield . .

one side of the picture

the hazard: the spark: the flame: the inferno!

and the other side

Simplex Flameproof equipment—a range of units that have met every specification, passed every official test. Exceptional stuff, Simplex Flameproof—and in certain instances unique . . .

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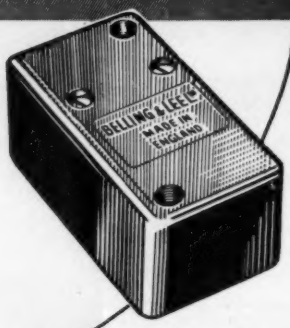

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Flexible.	Micanite cloth and paper.
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Heat Resisting.	Mica tapes.

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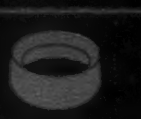
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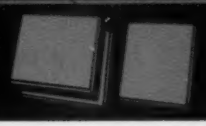
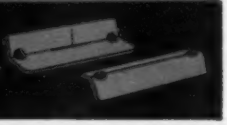

SHEETS.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WE MAKE EVERY TYPE OF MICANITE INSULATION

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These Specifications came into force on 1st January, 1958, and Scottish Cables Limited have pleasure in announcing that, as and from that date, a complete range of standard cables, manufactured under ideal conditions and guaranteed to comply with the new Quality Standards, is available at Economic Prices.

Specify 'SCOTTISH'—for guaranteed quality at economic prices!

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Associated Company: SCOTTISH CABLES (SOUTH AFRICA) LTD. PIETERMARITZBURG, NATAL

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For the efficient collection of very fine dusts

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CASE	Good quality wood with heavy gauge steel case.
ELEMENT	Long life spiral wound nickel chrome black heat.
REGULATOR	Mechanically robust, suitable zero/15 amps. Silent in operation.
VOLTAGES	200/220, 230/240, 250, A.C. Or D.C. without regulator.
LOADINGS	1kw. 2kw. 3kw.

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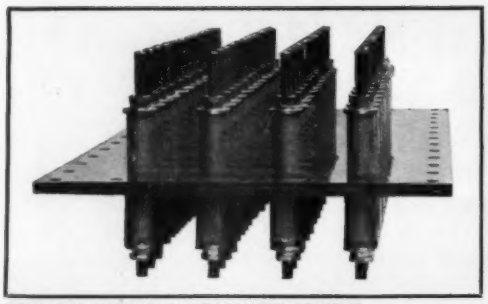

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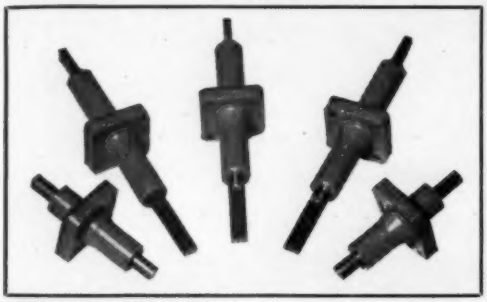
Permali produce the complete job from raw material to finished article—This EHT transformer terminal board, made from a Permali base with Dialam through-bushings, is one of many different components designed, manufactured, machined, assembled and tested entirely by Permali Ltd.



PERMALI LOOKS AHEAD
These cast-resin insulators, now being produced in quantity, constitute another new advance in manufacturing technique —made possible by constant research and development in the Permali laboratories.

PERMALI FOR PRECISION
This 132 kV arc-control device demonstrates the machineability and strength of Permali. Note how simply metal fittings can be combined with the material.

PERMALI CATERS FOR SPECIAL OPERATING CONDITIONS
Made from Grade TH material, this bus barrier board is specially moisture resisting for tropical and high humidity applications.

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PERMALI

COMPLETE SERVICE

for the design and development of components in:—

PERMALI — the insulating material outstanding for strength
PERMAGLASS — Glass fibre reinforced plastics
PERMAFLON — the P.T.F.E. plastic material with a unique combination of properties.
DIALAM — S.R.B. Paper and Fabric tubes.

Grades EH and TH Permali are MoS, Admirality, G.P.O., K.E.M.A. approved, fully meet BS 2572 and Def 5,000.

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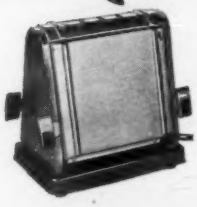
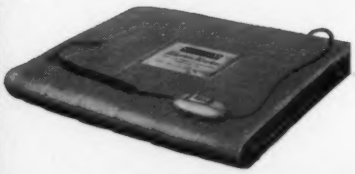


TOASTERS

WHISTLING KETTLES



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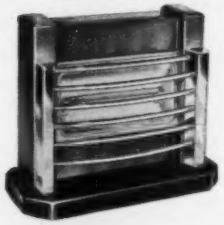

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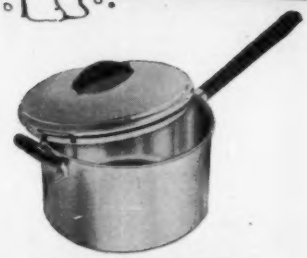

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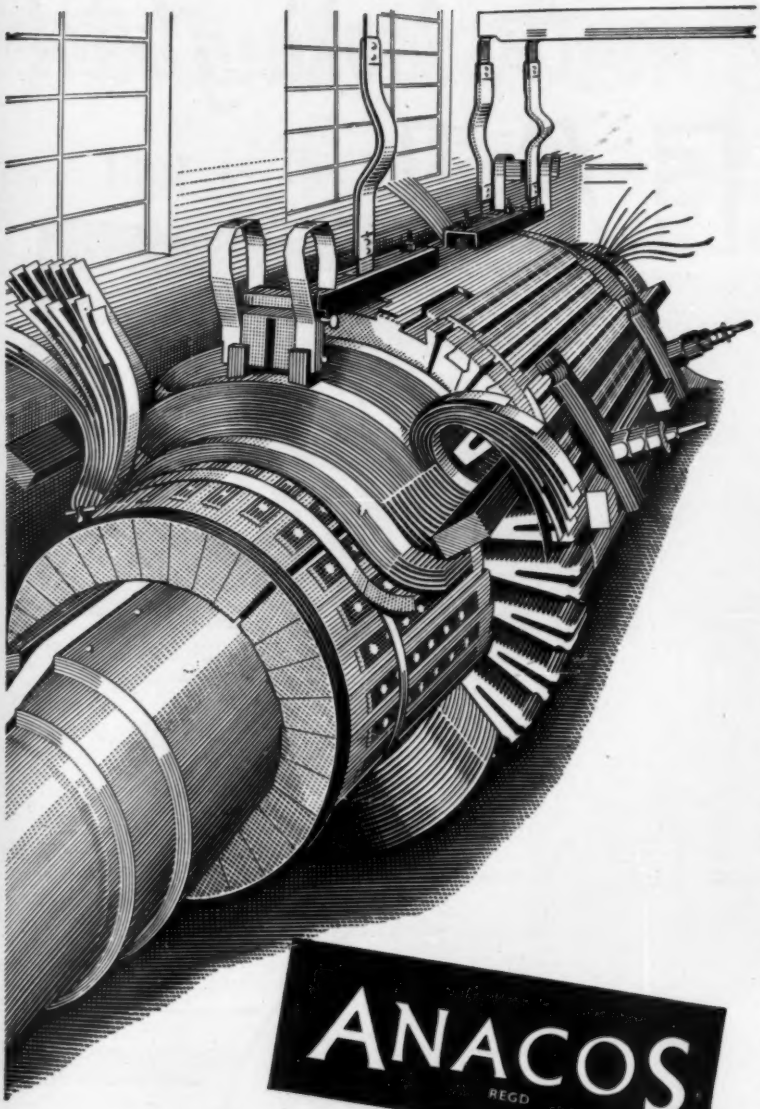

Power behind Power

This rotor for a turbo-alternator is being wound with half coils of copper-silver alloy strip which finally will be united into complete coils by silver soldering.

'Anacos' Copper Strip maintains those precise qualities that are needed for reliability at all times.

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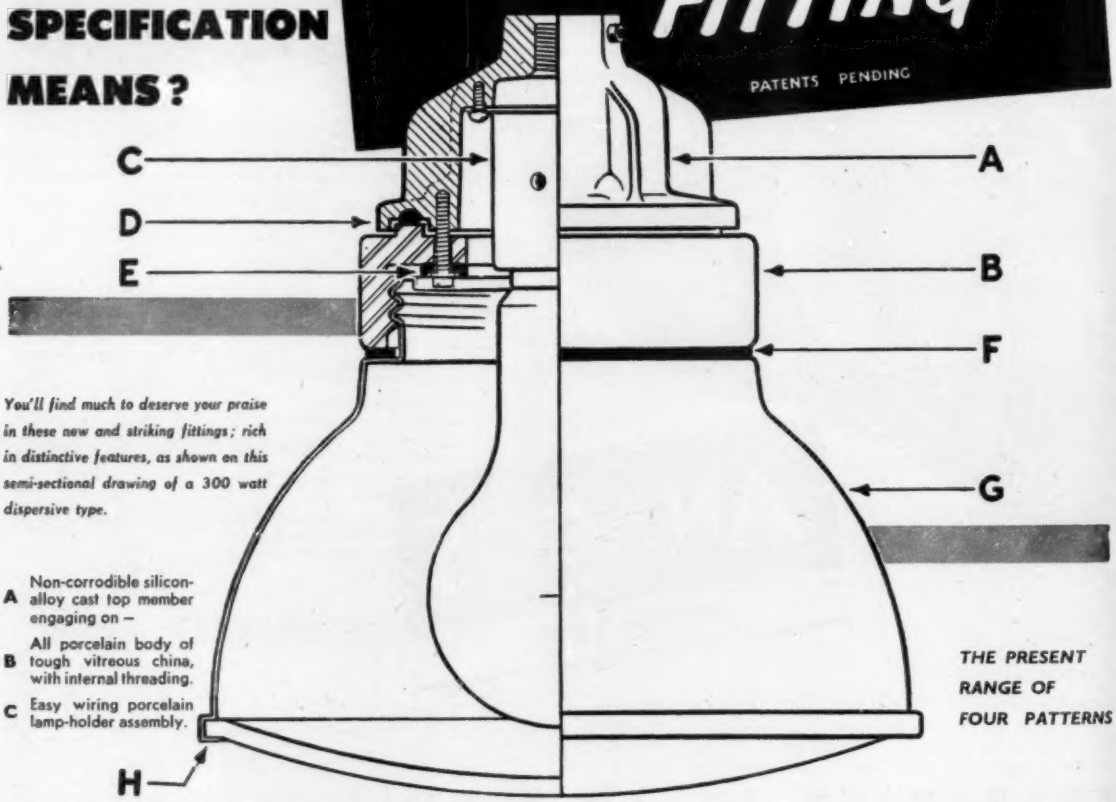

You'll find much to deserve your praise in these new and striking fittings; rich in distinctive features, as shown on this semi-sectional drawing of a 300 watt dispersive type.

A Non-corrodible silicon-alloy cast top member engaging on –

B All porcelain body of tough vitreous china, with internal threading.

C Easy wiring porcelain lamp-holder assembly.

D Gastight and dust-tight joint between top member and porcelain body.

E Silicon-alloy supporting ring reinforcing 3-point fixing of porcelain body to top member.

F Bonded cork gasket providing positive joint between porcelain body and –

G Screw neck reflector of heavy gauge aluminium, specially treated.

H Heavy section pressed heat-resisting glass dome, permanently sealed in position at mouth of reflector.

THE PRESENT RANGE OF FOUR PATTERNS

List No.	Description	Lamp Size
1090	Dispersive 10" dia.	100 watt
1093	Concentrating 8" dia.	100 watt
2000	Dispersive 12" dia.	200 watt
2010	Dispersive 12" dia.	300 watt

Publication No. P5601 gives full details of this new range

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For reliability

and simplicity of

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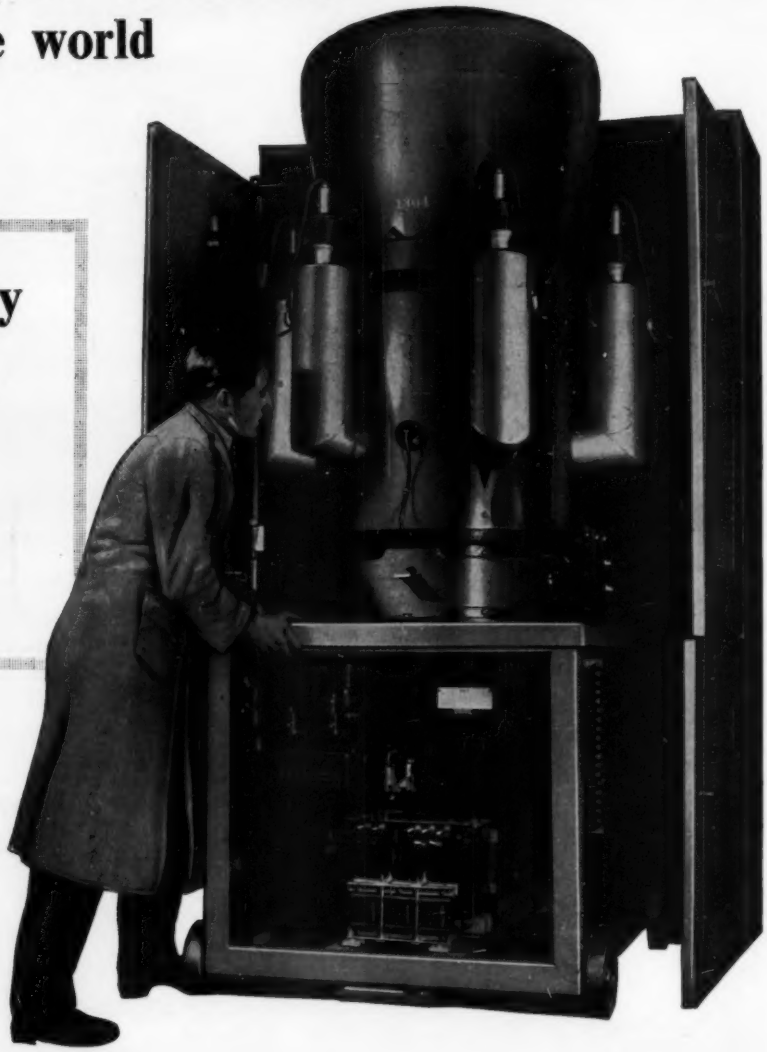

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compact heavy duty control units

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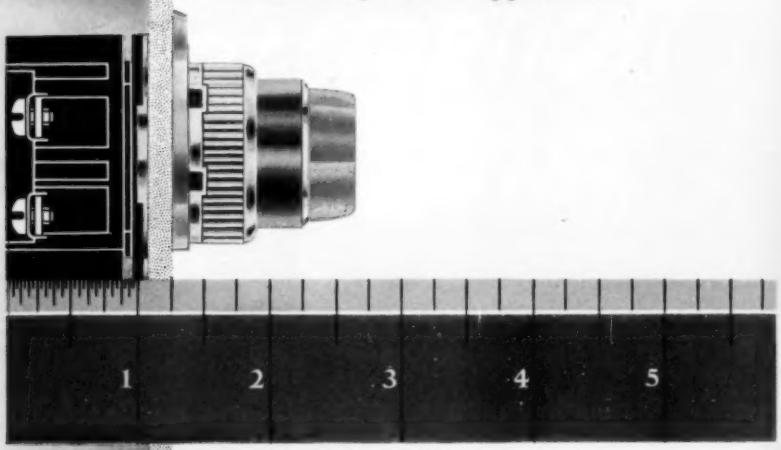
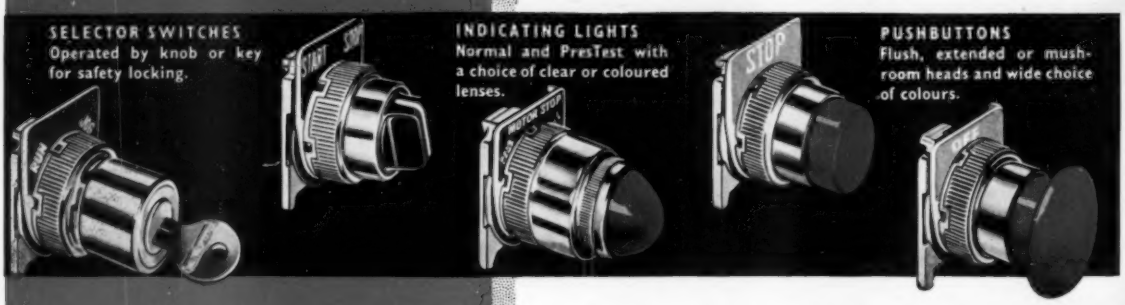


IGRANIC

range of units available

This modern range of space-saving control units includes pushbuttons, indicating lights, selector switches, and roto-pushbuttons, with a flexibility in circuit arrangements almost unlimited. Full particulars upon application to Publicity Department, Bedford.



IGRANIC

heavy duty oil-tight control units

IGRANIC ELECTRIC CO LTD

HEAD OFFICE AND WORKS BEDFORD

LONDON & EXPORT OFFICE VICTORIA STATION HOUSE 191 VICTORIA STREET SW1

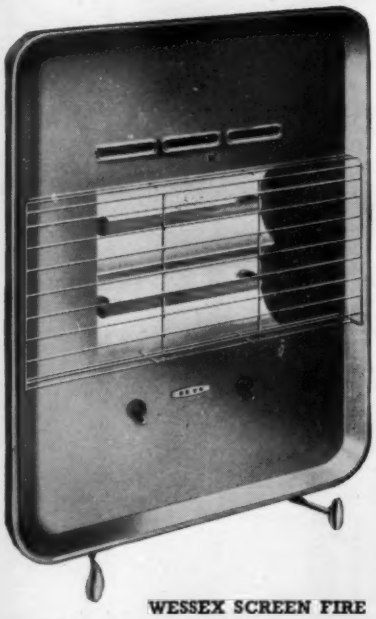
A METAL INDUSTRIES GROUP COMPANY

DISTRICT OFFICES BIRMINGHAM BRISTOL CARDIFF EAST ANGLIA GLASGOW LEEDS MANCHESTER NEWCASTLE SHEFFIELD

P846/IG/81

She loves a **good** fire...

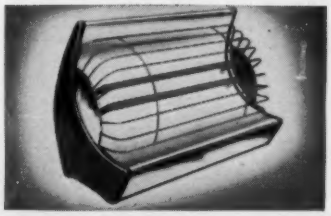
if it's a **REVO**



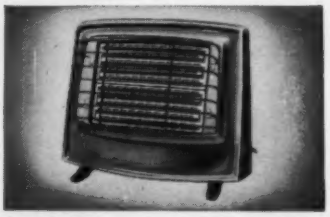
WESSEX SCREEN FIRE
An exciting example of the best in contemporary design. Functional too, because it completely screens the opening of an ordinary fireplace. Made in 2 sizes with adjustable feet and 2 k.w. pencil elements. Colours: Welsh Grey, Cotswold Stone, Pale Gold, Gay Red.

REVO Sales start at the drawing board! The designs illustrated are part of a range which has been evolved with one thought uppermost—*to make the strongest appeal to the widest variety of tastes.*
With their clean, functional lines, Revo Electric Fires will sell to every kind of customer. Only the highest grade materials are used, and the technical specification of each model conforms to the most stringent safety requirements.

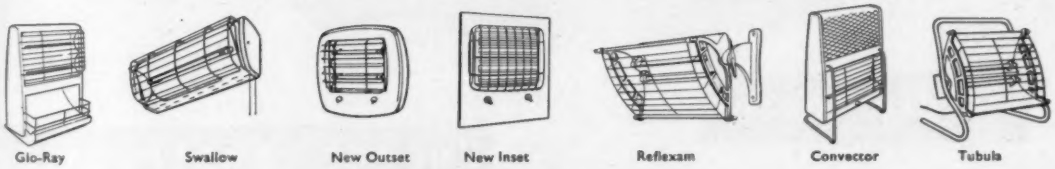
*** NATIONAL ADVERTISING GUARANTEES SALES**
Powerful, well-timed, full and half-page adverts in national magazines will create widespread demand for these Revo fires. Place orders now!



CRESCENT. Delightfully shaped model in enamelled sheet steel with electro-brightened anodised reflector, plated guard and pencil type elements 1 kw. or 2 kw. Colours: Welsh Grey, Cotswold Stone, Pale Gold, Gay Red.



SOMERSET. A fire with superb finish and sound construction. Gleaming vitreous enamel finish with plated guard and block type elements. 1 k.w. or 2 k.w. Colours: Oyster Grey, Guardsman Red, Citron Yellow, Willow Green.



Glo-Ray Swallow New Outset New Inset Reflexam Convector Tubula

It's time you knew all about REVO ELECTRIC FIRES

Write to REVO for full details of Electric Cookers, Kettles, Irons, the ROBOT Time Control Unit and the MAYFAIR Plate Warmer.

REVO ELECTRIC CO. LTD., TIPTON, STAFFS. *'PHONE: TIPTON 2828. 'GRAMS: REVO TIPTON*

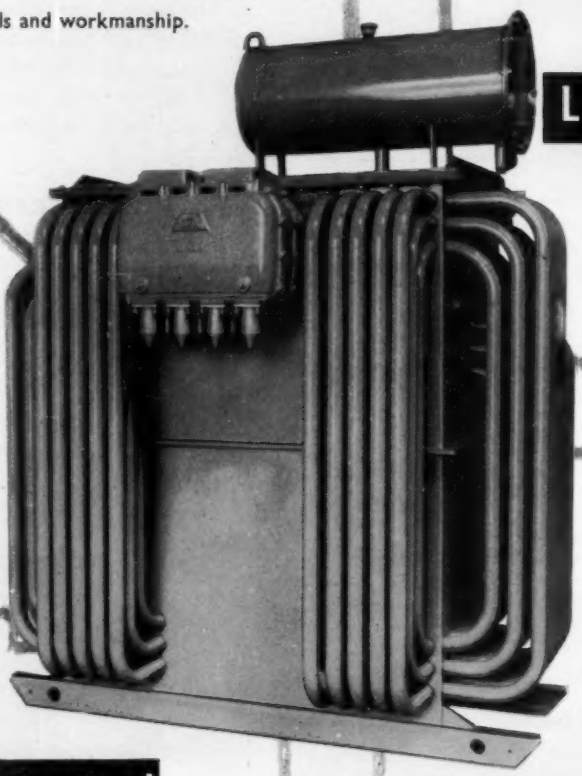
POWER DISTRIBUTION TRANSFORMERS

WODEN TRANSFORMER CO. LTD

Woden Transformers combine high precision and utmost reliability in service.
Both research and production are centred on the manufacture of first-class equipment at the lowest possible cost, consistent with quality materials and workmanship.

Low first cost

Woden Transformers are designed and manufactured for all standard applications up to 1000 kVA for Power House, Sub-station and Distribution purposes

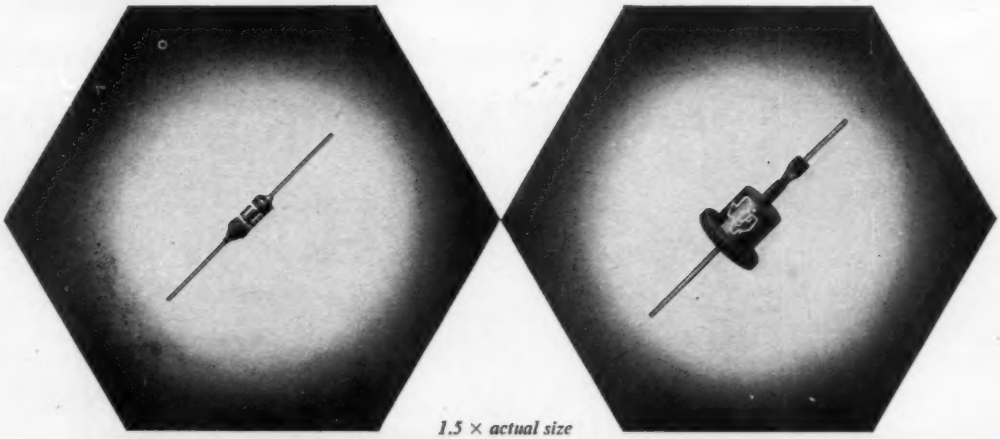


Rigidly tested

Robust construction

WODEN TRANSFORMER CO. LTD
BILSTON STAFFS
Tel: BILSTON 41959

SM/W 2945



1.5 × actual size

400 mA

"Moly-G", hard glass hermetically sealed case.
Unit Weight 0.195 Grms.

750 mA

Hermetically sealed metal case.
Unit Weight 1.6 Grms.

NOW AVAILABLE

SILICON RECTIFIERS

200—600 volts P.I.V.

These new 'Texas' Diffused Silicon Rectifiers provide you with :—

High current with high voltage
High Forward to reverse current ratio
Wide operating temperature range

TYPE NUMBERS	Peak Inverse Voltage:	200	300	400	500	600	volts
	Moly G:	1S111	1S112	1S113	1S114	1S115	
	Metal Case:	1S001	1S002	1S003	1S004	1S005	
				'MOLY G'	'METAL CASE'		
MAXIMUM RATINGS	Average rectified Forward Current at 25°C			400	750		mA
	Average rectified Forward Current at 150°C			150	250		mA
	Recurrent Peak Forward Current at 25°C			1.25	2.5		Amp.
	Surge Current 1 Sec. D.C. at +25°C to 150°C			3.0	15.0		Amp.
SPECIFICATIONS	Max. Reverse Current at P.I.V. 25°C			0.2	10.0		μA
	Max. Reverse Current at P.I.V. 100°C			15.0	300		μA
	Max. Voltage Drop at I_o=400 mA at 25°C			1.0	1.0		volt

Please write for Data Sheets of these Rectifiers and of our comprehensive range of Silicon Transistors.

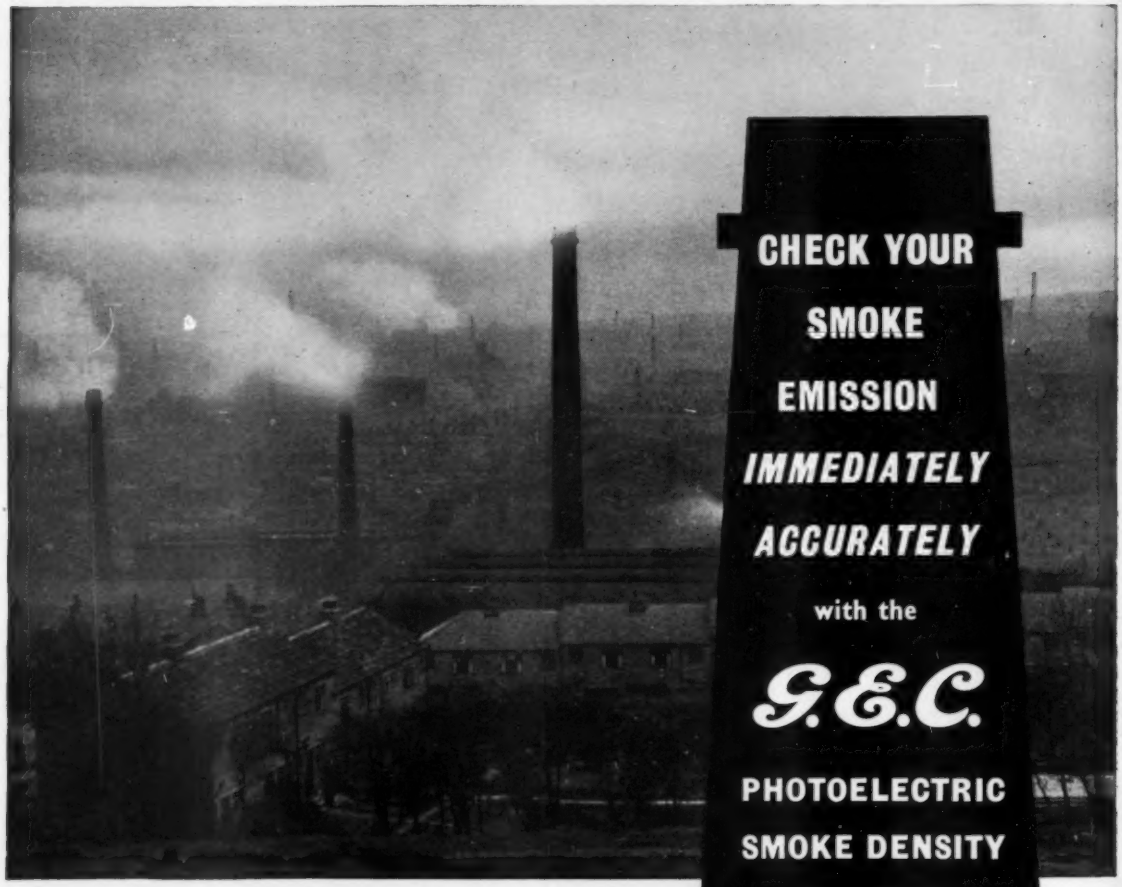
TEXAS INSTRUMENTS LIMITED

DALLAS ROAD · BEDFORD · TEL: BEDFORD 68051 · CABLES: TEXINLIM, BEDFORD

T2

SMOKE

A MATTER OF URGENCY FOR EVERYONE

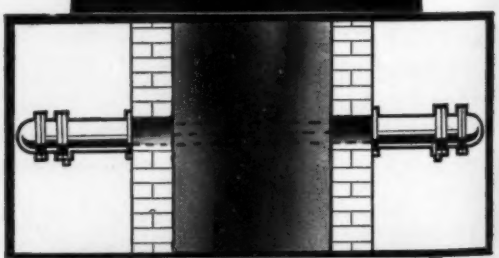


CHECK YOUR SMOKE EMISSION *IMMEDIATELY ACCURATELY*

with the

G.E.C.

PHOTOELECTRIC SMOKE DENSITY MONITOR



The G.E.C. Photoelectric Smoke Density Monitor has been designed, in the interest of smoke abatement, to monitor the density of smoke in a stack. A light beam is projected across the stack. Visual and audible alarm systems operate whenever the density exceeds a pre-set level, the event being recorded. The circuit is designed so that, wherever possible, failures of components set the warning relay to the alarm position.

- *Constructed to comply with BS 2740/1956.*
- *Suitable for spans of 1 ft. to 10 ft.*
- *All enclosures are weatherproof and of cast construction.*
- *Stabilised power supply to projector and receiver.*
- *Projector intensity is electrically adjustable for varying operational conditions.*
- *Calibration by means of one simple adjustment.*
- *Provision for an air flow over the glass slides reduces deposits of soot thus minimising manual cleaning.*

For further details, please write for Publication OV 3865

THE GENERAL ELECTRIC CO LTD · MAGNET HOUSE · KINGSWAY · LONDON · WC2

Classified Advertisements

CLASSIFIED advertisements are PREPAID at 3/6 per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number there is an additional charge of 1/-.

DISPLAYED CLASSIFIED:—48/- per inch. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue and should be addressed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

CITY AND COUNTY OF LICHFIELD

Group "A" Street Lighting

Beacon Street and Stafford Road, A.51

TENDERS are invited for the supply, erection and installation of 25 Fluted Steel Columns, together with Sodium Lanterns and all ancillary equipment.

Application for contract documents should be made to the City Engineer and Surveyor, Mr. D. Oglesby, M.I.Mun.E., Meredith House, 62, Wade Street, Lichfield.

Applications must be accompanied by a deposit of two guineas, which is returnable on receipt of a bona fide tender not subsequently withdrawn.

Tenders in a plain sealed envelope endorsed "Street Lighting A.51" must be received by the undersigned not later than noon on Friday, 7th February, 1958.

The Council does not bind itself to accept the lowest or any tender.

HENRY J. CALLENDER,
Town Clerk.

Guildhall,
Lichfield.
31st December, 1957. 1875

WIGTON RURAL DISTRICT COUNCIL

Street Lighting Schemes at Wigton and Aspatria

TENDERS are invited in respect of each scheme for :—

(1) Supplying approximately 60 tubular steel columns and brackets, mounting height 25 feet.
(2) Supplying approximately 60 enclosed lanterns, 140-watt sodium lamps, and control gear.
(3) Erecting approximately 60 columns and putting scheme into service.

Any contractor may tender for one or more contracts. Copies of documents obtainable from the Surveyor on payment of £2 deposit, to be refunded on receipt of bona fide tender. Plans may be inspected at Council Offices.

Tenders in sealed envelopes endorsed "Street Lighting Tender" to be received by the undersigned by 10 a.m. on 10th February, 1958.

C. GRAHAM,
Clerk.

Council Offices,
Wigton, Cumberland. 1892

COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE

TENDERS are invited for the supply and erection of sixteen points of 250-watt H.P.M.V. Class "A" Overhead Lighting, complete with concrete columns, cut-off type lanterns, lamps, chokes, capacitors and fuses, for the illumination of a roundabout to be constructed immediately to the south of Wetherby on the London-Edinburgh-Thurso Trunk Road, A.1.

Forms of tender and further particulars may be obtained from the County Engineer and Surveyor, County Hall, Wakefield.

The County Council do not bind themselves to accept the lowest or any tender.

Sealed tenders must be addressed to me, the undersigned, and received at Room 87, County Hall, Wakefield, not later than 12 noon on Monday, the 20th January, 1958.

BERNARD KENYON,
Clerk of the County Council.

County Hall,
Wakefield. 1890

DAMODAR VALLEY CORPORATION

THE office of the Damodar Valley Corporation, Anderson House, Alipore, Calcutta, 27, India, invites tenders for the following :—

D.V.C. Tender Enquiry No. PE-SPEC. 37, for the supply of Passenger Elevator with accessories for DVC Durgapur Thermal Power Station.

Specifications, drawings, etc., relative to the above can be purchased direct from the Damodar Valley Corporation, of the above address, at 12s. per copy plus £1 17s. 6d. for air parcel charges. Tenders are to be returned direct to Damodar Valley Corporation, Anderson House, Alipore, Calcutta, 27, India, to reach them by 3 p.m. on 30th January, 1958.

Specimen copy of the above specification is on view at India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, under ref. S.2983/57.AVH/ENG.2. 1891

ROXBURGH COUNTY COUNCIL

Street Lighting, Group "A"

TENDERS invited for supply, delivery and erection of 34 Steel Street Lighting Units, complete with lanterns and fittings for 140-watt Sodium Discharge Lamps at Newtown St. Boswells.

Specification, etc., from County Surveyor, on payment of £2 2s. deposit, returnable on receipt of bona fide tender not subsequently withdrawn.

Sealed tenders (lowest or any may not be accepted) endorsed "Street Lighting Group A," to County Clerk, Newtown St. Boswells, by noon 30th January, 1958. 1852

COUNTY BOROUGH OF NORTHAMPTON

CONTRACTORS wishing to tender for the re-wiring of the Electrical Services to the Central Museum, Guildhall Rd., Northampton, should apply to the Borough Architect, Guildhall, Northampton, before 14th January, enclosing crossed cheque (payable to "Northampton Corporation") for £2 2s. This sum will be returned if a bona fide tender is received by 10 a.m. on 12th February.

C. E. VIVIAN ROWE,
Town Clerk. 1876

SITUATIONS VACANT

LIVERPOOL REGIONAL HOSPITAL BOARD

ASSISTANT ENGINEER (Electrical) required on the staff of the Regional Engineer.

Applicants should have passed the Institution Examination and be Graduate Members of the Institution of Electrical Engineers; be experienced in the preparation of specifications, drawings and estimates for distribution schemes, electrical installations in hospitals and buildings, and be able to take details of existing installations and have a good knowledge of modern installation practice.

Commencing salary within the scale £700-£1,015 per annum, dependent on age and previous relevant practical experience.

Applications stating age, qualifications, experience, present and previous appointments, with names and addresses of three referees (two technical), to reach me at 19, James Street, Liverpool, 2, not later than 25th January, 1958.

VINCENT COLLINGE,
Secretary to the Board. 1831

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

APPLICATIONS are invited for the following appointments in this Division :—

ASSISTANT SHIFT CHARGE ENGINEER, DRAKELOW POWER STATION (Vacancy No. 2/58/ER).

Applicants should have suitable technical qualifications and experience in power station operation.

Salary will be within Class J, Grade 9 (£935-£995 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 22nd January, 1958.

GENERAL ASSISTANT ENGINEERS (Chemist).

A General Assistant Engineer (Chemist) is required at the following Power Stations :—

Drakelow Power Station (Vacancy No. 3/58/ER).
Castle Donington Power Station (Vacancy No. 1/58/ER).

Candidates must have had a sound technical training and some previous laboratory experience and should hold the Ordinary National Certificate in Chemistry.

Salary will be within the range £540-£680 per annum in accordance with the National Joint Board Agreement.

Closing date for receipt of applications, 22nd January, 1958.

These appointments will be pensionable under the terms of the Staff Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.

1st January, 1958. 1856

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

Willington Power Station

APPLICATIONS are invited for the following vacancies which exist at this Power Station :—

FITTER (Electrical) at 4s. 7½d. per hr.
WELDER (Craftsman) at 4s. 7½d. "
VAN DRIVER (Light) at 4s. "

Appointments, which will be permanent, will be made in accordance with N.J.I.C. terms and conditions of service and, subject to qualifying service, successful applicants will be eligible for sickness benefit, holiday pay and membership of the C.E.A. Manual Workers' Superannuation Scheme.

Canteen facilities will shortly be available on site and working conditions and amenities are of the high standard to be expected at a large modern power station.

Apply to the Station Superintendent, Central Electricity Generating Board, East Midlands Division, Willington Power Station, Twyford Lane, Willington, near Derby, by LETTER ONLY, for official form of application. 1857

Situations Vacant (continued)

YORKSHIRE ELECTRICITY BOARD

Head Office
Chief Engineer's Department

SECOND ASSISTANT ENGINEER, Distribution Design (Substations).

Duties will include the design of indoor and outdoor substations operating at voltages of 33 kV and above, the preparation of specifications for substation plant and subsequent negotiations with plant manufacturers. They will also cover protective gear applications on the primary H.V. system.

Applicants should preferably be Corporate Members of the Institution of Electrical Engineers and hold a University degree in electrical engineering. They should have a sound general knowledge of substation plant and design requirements and have had some experience of field construction. Some specialised knowledge of transformers, switchgear or protective gear would be an advantage.

Salary N.J.B. Class AX-EX, Grade 4, £1,145/£25/£1,270 rising to £1,410.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Road, Scarcroft, Near Leeds, not later than 24th January, 1958.

No. 5 (Wakefield) Sub-Area

THIRD ASSISTANT ENGINEER (Distribution Design).

Applicants should be Graduate Members of the Institution of Electrical Engineers or hold equivalent qualifications, and have had experience in planning extensions of distribution systems operating at 11 kV and below, together with the preparation of the relevant technical reports and estimates. They should also have had practical experience in the construction, operation and maintenance of H.V. and M.V. distribution systems. This appointment offers an opportunity for a wide and varied experience to be obtained in a sub-area distribution design section.

Salary N.J.B. Class L, Grade 10, £995/£20/£1,055 per annum.

BARNSLEY DISTRICT
THIRD ASSISTANT DISTRICT ENGINEER.

Applicants should have a sound practical training and experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution networks, substation plant and ancillary equipment.

Candidates should preferably have attained the technical standard of the Higher National Certificate in Electrical Engineering, or equivalent qualifications.

Candidates must be prepared to reside in the district and undertake standby duties.

Salary N.J.B. Class G, Grade 9, £835/£15/£880 per annum.

CASTLEFORD DISTRICT (2 Posts)
DONCASTER DISTRICT (2 Posts)
THIRD ASSISTANT DISTRICT ENGINEERS.

Applicants should have had practical training and experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution network, substation plant and ancillary equipment.

Candidates should preferably have attained the technical standard of the Higher National Certificate in Electrical Engineering or equivalent qualifications.

Candidates must be prepared to reside in the respective district and undertake standby duties.

Salary N.J.B. Class F, Grade 9, £790/£15/£835 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricty Board, 1a, Denby Dale Road, Wakefield, not later than 24th January, 1958.

No. 6 (Hull) Sub-Area

SUB-AREA HOUSECRAFT ADVISER.

Applicants should be qualified Demonstrators (Female) holding a recognised diploma in Domestic Science and it will be an additional advantage if they possess the E.A.W. Certificate and Diploma. They must have had experience in the organisation of a demonstration and lecture service, control of demonstrators, and be capable of establishing relations with the education authorities, institutions, industrial and commercial catering establishments, and advising them on the use of electrical equipment.

Salary N.J.C. Grade 4, £765/£25/£840 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than 24th January, 1958. 1908

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:—

Worcester and District Sub-Area

THIRD ASSISTANT ENGINEER (Planning and Operations) (Headquarters).

The successful applicant will be required to carry out investigations into system load flows, fault levels and protection and to assist in the preparation and checking of protection schemes and with internal telephone and V.H.F. radio communications. Technical qualifications desirable. Salary £935/£995 per annum (N.J.B. Grade K.10).

Apply by letter, within fourteen days, stating age, experience, present salary and position, to Mr. R. Mallett, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

Wolverhampton and District Sub-Area

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER (Cannock District).

Applicants should have a sound technical training with wide practical experience in the sale and installation of domestic, commercial and industrial electrical equipment and the wiring associated therewith, negotiating new supplies, and public lighting contracts. Technical qualifications desirable. Salary £885/£930 per annum (N.J.B. Grade E.6).

Apply by letter, within seven days, stating age, qualifications, experience, present salary and position, to Mr. D. Holt, Sub-Area Manager, Midlands Electricity Board, 83, Darlington Street, Wolverhampton.

Shropshire and Herefordshire Sub-Area

THIRD ASSISTANT (CONTROL) ENGINEER (Headquarters).

The successful applicant will be required to take charge of the switching operations of 11 kV, 33 kV and 66 kV systems on shift rota. Technical qualifications desirable. Salary £835/£880 per annum (N.J.B. Grade H.10), plus 10% shift enhancement from the commencement of shift duties.

Apply by letter within ten days, to Mr. W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

Central Gloucestershire Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER (Dean Forest District).

Candidates should have had a sound technical training and experience in the construction, maintenance and operation of overhead and underground networks up to and including 33 kV. Technical qualifications desirable. Salary £835/£880 per annum (N.J.B. Grade E.7).

Apply by letter, stating age, qualifications, experience, present position and salary, to Mr. S. Rayboudl, Sub-Area Manager, Midlands Electricity Board, 126, London Road, Gloucester.

North Staffordshire Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER (Congleton District).

Applicants should have experience in planning, construction, operation and maintenance of medium and high voltage distribution systems including reinforcements and extensions. Technical qualifications desirable. Salary £790/£835 per annum. (N.J.B. Grade D.7).

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER (Stone/Market Drayton District).

Applicants should have had experience in contracting including the preparation of estimates and in sales of electrical apparatus. Experience in the installation and use of agricultural equipment, and radio and television will be additional recommendations. The successful applicant will operate in the Market Drayton area. Technical qualifications desirable. Salary £790/£835 per annum (N.J.B. Grade E.8).

Apply by letter, within fourteen days, stating age, qualifications, present salary and position, to Mr. H. A. P. Caddell, Sub-Area Manager, Midlands Electricity Board, 234, Victoria Road, Fenton, Stoke-on-Trent.

A. STEPHENS,
Secretary.
1898

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Essex Sub-Area

DISTRICT MANAGER, CHELMSFORD DISTRICT (5/58.R).

Candidates should possess sound commercial engineering and administrative experience gained in posts with managerial responsibility in rapidly expanding electricity undertakings, with urban, rural and industrial characteristics.

Corporate Membership of the Institution of Electrical Engineers will be regarded as an additional qualification.

Personality, leadership and the ability to organise are qualities which will be considered in making this appointment.

Salary N.J.M. Scale, Class C, Grade 5 (£1,900-£2,100).

Apply by letter, within 14 days, to R. W. J. Benyon, M.I.E.E., A.I.I.A., Manager, Essex Sub-Area, Eastern Electricity Board, Millfield, Bentley, Nr. Brentwood, Essex.

Chilterns Sub-Area

SECOND ASSISTANT ENGINEER, AYLESBURY DISTRICT (3/58.R).

Candidates should have had a sound technical education and wide experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems including substations.

Salary N.J.B. Class F, Grade 7 (£885-£930).

Apply by letter, within 14 days, to the Manager, Aylesbury District, Eastern Electricity Board, Exchange Street, Aylesbury, Bucks.

FOURTH ASSISTANT ENGINEER, BEDFORD DISTRICT (4/58.R).

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground systems including substations.

Salary N.J.B. Class F, Grade 11 (£685-£730).

Apply by letter, within 14 days, to the Manager, Bedford District, Eastern Electricity Board, Prebend Street, Bedford.

Essex Sub-Area Headquarters

ENGINEERING DRAUGHTSMAN (Architectural) (1/58.R).

Candidates should have had a good technical training and experience in the preparation of plans and detailed drawings of building and civil engineering works including substations, offices and workshops.

Salary N.J.B. Schedule D, Grade 6 (£595-£715) plus London allowance.

Apply by letter, within 14 days, to E. A. Cullen, M.I.E.E., Engineer, Essex Sub-Area, Eastern Electricity Board, Millfield, Bentley, Nr. Brentwood, Essex. 1899

ELECTRICAL DESIGN

YOUNG man out of apprenticeship, 21-25, to train in electrical design of rotating machines. Higher National and with, or prepared to work for, Grad. I.E.E.

Apply immediately with full particulars of training to :—

General Works Manager
MAWDSLEY'S LIMITED
Dursley, Glos

1860

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

CONSUMERS' ENGINEER required at Chester. Salary £885/£930 per annum (N.J.B. G/8). Applicants should have technical training, a wide knowledge of electrical appliances, domestic and commercial utilisation, tariffs and consumers' contracting enquiries.

Appointment subject to medical examination. Pension scheme.

Applications, on forms obtainable from the Manager, No. 3 Sub-Area, Electricity House, Newgate Street, Chester, must be forwarded not later than 15th January, 1958. 1833

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

APPLICATIONS are invited for the following positions:—

ASSISTANT SECTION ENGINEER, UXBRIDGE SECTION (S/13.980).

Applicants should have had experience in the maintenance and operation of a high voltage system, including both cable and overhead line work. Manufacturing works experience with high voltage transformers and/or switchgear is desirable and a knowledge of overhead line construction work will be an advantage. Candidates should hold qualifications leading to Corporate Membership of the Institution of Electrical Engineers or its equivalent.

Salary N.J.B. AX/CX, Grade 7, £810-£985 plus London allowance.

FOURTH ASSISTANT ENGINEER, TECHNICAL DEPARTMENT (S/13,981).

Applicants should have received a sound technical education and preference will be given to those possessing qualifications leading to corporate membership of a senior professional engineering institution.

The successful applicant will be required to deal particularly with special experimental investigations into technical problems.

Salary N.J.B. AX/CX, Grade 8, £710-£885.

GENERAL ASSISTANT ENGINEERS (S/13,982).

Applicants should have served an apprenticeship or had practical training suitable to the industry. They should possess a sound general and technical education and preference will be given to those possessing a Higher National Certificate (or those nearing completion of H.N.C. courses). Opportunities are available for general assistant engineers to complete their studies and gain wide experience with good prospects of promotion.

The duties of those appointed will vary, but will include as a general rule, the operation and control, under supervision, of generating plant. A number of these vacancies are at the oil-firing stations at Marchwood, Near Southampton, and Poole.

Vacancies also exist for those who wish to specialise in maintenance of electrical and mechanical generating plant, transmission lines, substations and cables, or generating station construction work.

Salary N.J.B. within scales £540-£730.

Special application forms, obtainable only from P. D. A. Oliver, Esq., Divisional Secretary, Central Electricity House, High Street, Portsmouth, should be returned by 22nd January, 1958. 1897

H.N.C. (E.) OR O.N.C. (E.)

TENDERING AND CONTRACTS ENGINEERING

with

'ENGLISH ELECTRIC' STAFFORD

WE wish to appoint a number of young Engineers in the following fields :—

MINING.
METAL INDUSTRIES.
INDUSTRIAL PLANT.
POWER TRANSFORMERS.
POWER SYSTEMS METERS AND RELAYS.

There are openings for engineers with either the qualifications to continue or the wish to take up a career in this work.

A COURSE will be arranged for suitable people who have insufficient experience for direct employment.

These are all pensionable staff appointments.

Please write, indicating the field in which you have most interest, to Dept. C.P.S., Marconi House, 336/7, Strand, London, W.C.2, quoting Ref. ER.1297J. 1765

THE NATIONAL INSPECTION COUNCIL FOR ELECTRICAL INSTALLATION CONTRACTING

requires an INSPECTING ENGINEER for the area of South Wales, Monmouthshire, Herefordshire and West Gloucestershire.

Starting salary £1,000 p.a., together with car allowance, travelling and subsistence allowances and superannuation.

Applicants must have had supervisory experience in electrical installation contracting, a thorough knowledge of the I.E.E. Wiring Regulations and of good wiring practice, and be prepared to reside within the area.

Applications by 31st January to the Secretary, National Inspection Council for Electrical Installation Contracting, 13, Victoria Street, London, S.W.1. 1843

Applications for employment are invited for the following vacancies by

FIRST ELECTRIC CORPORATION OF JOHANNESBURG, SOUTH AFRICA

1. A SENIOR DESIGN ENGINEER is required to take charge of a general engineering department. The work will involve the engineering of composite schemes covering motors, switchgear, transformers, control gear, etc., and the co-ordination of the general handling of the contracts in the works. Previous experience of this type of work is required, and the position is permanent and pensionable.

2. ESTIMATOR with experience in electrical manufacture, preferably in motor, transformer or switchgear. Design experience a recommendation. This is a senior position and offers good prospects to suitable candidate.

3. CONTROL GEAR ENGINEER required with sound experience in design and application of motor control gear 1 to 2,000 h.p. The work is interesting and varied, involving pre-estimate design and contracts engineering of switchgear projects. Previous experience essential, offering good prospects, starting salary and excellent working conditions.

Selective candidates are offered a three-year contract with sea or air passage for himself and family. Medical and pension funds available.

Apply in the first instance, giving full particulars age, experience, etc., to EGE, Crown House, Aldwych, London, W.C.2.

1828

ELECTRICAL ENGINEER REQUIRED TO ASSIST DIRECTORS

OPPORTUNITY for bright young man with initiative and knowledge of rotating machinery and all types of control gear. Candidates should be able to design circuits for automatic control and contactor gear, and have had drawing office experience. Qualifications preferred are Higher National Certificate or a University Degree.

Good salary and excellent prospects.

Applicants should state technical qualifications, age and experience, present position and salary in strict confidence to Hampson Industries Limited, Bull Lane, Greets Green, West Bromwich. 1803

SOUTH EASTERN ELECTRICITY BOARD

FITTER (Electrical),
Hastings District.

Wages 4s. 7½d. per hour for 44-hour, 5-day week under N.J.I.C. Agreement. The successful candidate will be employed on erection, repair and maintenance of E.H.V. switchgear transformers and associated equipment on outdoor and indoor substations.

Applications, naming two referees, on forms from G. C. Everard, District Manager, SEEBOARD, 12/13, York Buildings, Hastings, by 22nd January, 1958.

JOINTER,
Sevenoaks and Reigate District.

Wages 4s. 5½d. per hour for a 44-hour, 5-day week under N.J.I.C. Agreement. Applicants must be skilled craftsmen, and able to joint all classes of low, medium and high voltage cable. Vacancy occurs in the Reigate and Horley part of the district. Superannuation optional.

Applications to H. F. Gill, District Manager, SEEBOARD, Electric House, West Hill, Oxted, by 20th January, 1958.

JOINTER (Extra High Tension),
Sevenoaks and Reigate District.

Wages 4s. 7½d. per hour for a 44-hour, 5-day week under N.J.I.C. Agreement. Applicants must be skilled craftsmen and able to joint and connect all classes of cable including extra high teition. Vacancy occurs in the Reigate and Horley part of the district. Superannuation optional.

Applications to H. F. Gill, District Manager, SEEBOARD, Electric House, West Hill, Oxted, by 20th January, 1958.

LADY DEMONSTRATOR,
Lewes District.

Salary £500 × £20 to £600 p.a., under N.J.C. Grade 1. Superannuable. Applicants should possess a recognised diploma or certificate in domestic science, also E.A.W. Certificate. The successful applicant will be required to conduct lectures and demonstrations, advise consumers, and generally assist in any of the district's showrooms.

Applications on forms from District Manager, SEEBOARD, 80/81, High Street, Lewes, Sussex, by 22nd January, 1958.

A. L. BURNELL,
Secretary.
1909

CENTRAL ELECTRICITY GENERATING BOARD

South Western Division

FOURTH ASSISTANT ENGINEER required in the Transmission Department, Divisional Headquarters, Bristol.

Superannuation scheme. Salary N.J.B. Class AX/DX, Grade 8, £710-£835/£910.

Applicants should possess qualifications leading to Corporate Membership of I.E.E., and experience in the maintenance or construction of overhead lines and/or substations would be considered an advantage.

Vacancy No. 797/57. Closing date 18th January, 1958.

THIRD ASSISTANT ENGINEER required in the Technical Department, Bristol Region.

Superannuation scheme. Salary N.J.B. Class AX/DX, Grade 6, £895/£1,020/£1,110.

Applicants should have a good general and technical education and have had wide experience in testing, commissioning and maintaining protective and control equipment in generating and transmission stations. Organising ability and a university degree would be an advantage.

Vacancy No. 807/58. Closing date 18th January, 1958.

FOURTH ASSISTANT ENGINEER required in the Transmission Department at Divisional Headquarters, Bristol.

Superannuation scheme. Salary N.J.B. Class AX/DX, Grade 8, £710-£835/£910.

Duties mainly concerned with the planning and construction of high-voltage overhead transmission lines. A higher technical education is desirable, and ability in instrumental survey is essential.

Vacancy No. 809/58. Closing date 23rd January, 1958.

Applications on Form A.E.6/ACT, obtainable from the Divisional Secretary, 26, Oakfield Road, Bristol, 8, should be completed and returned by the date stated. Please quote vacancy number. 1893

***Situations Vacant** (continued)*

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Maintenance and Operation)

Swindon District of No. 2 (Newbury) Sub-Area. Salary N.J.B. Class F, Grade 11 (£685-£730 per annum). N.J.B. conditions of service.

The duties of the post will be to assist with the maintenance and operation of H.V. and L.V. distribution mains and substations, and with minor construction work. A technical training to H.N.C. standard and experience of similar work are required.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, and returned to him, on completion, in envelopes suitably endorsed, not later than 20th January, 1958.

Engineering Draughtsman

No. 3 (Portsmouth) Sub-Area Office, Substation Section. Salary N.J.B. Schedule D, Grade 6 (£595 × £20 to £715 per annum) according to qualifications and experience. N.J.B. conditions of service.

Applicants should be qualified draughtsmen and the successful applicant will be required to undertake, under supervision, the preparation and final layout of diagrams and drawings relating to substation plant and equipment. Possession of suitable technical qualifications will be an advantage.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him, in envelopes suitably endorsed, not later than 20th January, 1958.

The successful candidates for the above appointments will be required to contribute to the C.E.A. and Area Boards (Staff) Superannuation Scheme, if eligible. 1910

SALES MANAGER

required by important and rapidly expanding company in S. London.

ESSENTIAL QUALIFICATIONS:

First-class education to Degree standard with Membership of Institution of Electrical Engineers or Institution of Mechanical Engineers.

Experience in control of wide export market—emphasis on Europe.

Experience with domestic appliance manufacturers.

Age 35 - 45 years.

Urge to succeed and recognition of need to dedicate life for next few years to achieve success.

Immediate remuneration and prospects will prove equal to requirements for right man only.

Write in confidence to—

Box 1836

ELECTRICAL ENGINEER (DESIGN)

THE Engineering Branch of the United Kingdom Atomic Energy Authority, Industrial Group, requires an Electrical Engineer at its Headquarters at Risley, Warrington, Lancashire, to take charge of a section responsible for design and specification of electrical equipment for large works, including H.T. and L.T. switchgear, substations and distribution.

A recognised apprenticeship and Corporate Membership of the Institution of Electrical Engineers or equivalent qualifications are required. Experience of the duties described is essential.

Salary assessed within scale £1,300-£1,740. Contributory pension scheme.

A house or assistance towards legal expenses on house purchase may be available.

Send postcard for application form, quoting reference 2181, to Recruitment Officer at above address.

Closing date 27th January, 1958. 1834

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS invited for following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT MAINTENANCE ENGINEER (Instruments), BANKSIDE POWER STATION (Vacancy No. 57/1181).

Maintenance of steam and water instruments and boiler control. Salary Class H, Grade 10 = £885 p.a.

BOILER HOUSE SHIFT CHARGE ENGINEER, BARKING A/B POWER STATION (Vacancy No. 57/1182).

Sound technical education and experience with modern boiler plant operation, including pulverised fuel firing. Applicants to Vacancy 57/991 need not re-apply. Salary Class L, Grade 9 = £1,115 plus £106 10s. shift p.a.

FIRST ASSISTANT STATION CHEMIST, WEST HAM POWER STATION (Vacancy No. 57/1183).

Candidates should be experienced in chemistry of power industry and preferably have held responsible post in laboratory. Possession of at least O.N.C. in Chemistry essential. West Ham laboratory also responsible for services to Bow Power Station. Salary Class J, Grade 9 = £985 p.a.

Applications, quoting vacancy number, to (or on form from) Central Electricity Generating Board, London Division, P.O. Box 136, London, W.1, by 20th January, 1958. 1855

AUTOMATIC TELEPHONE AND ELECTRIC COMPANY LIMITED

SCHOOL OF ELECTRONICS

APPLICATIONS are invited for the following appointments in the School of Electronics of the Automatic Telephone and Electric Company Limited, Liverpool.

SENIOR LECTURER, One post.
LECTURER, Two posts.

The work is postgraduate in nature, and involves lecturing on modern electronic technique as applied to communication engineering.

Candidates should possess an honours degree in either:—

(a) Electrical engineering with electronics or telecommunications.

(b) Physics, with electronics and/or mathematics.

Salaries will be in accordance with the Burnham Technical Scale. Persons appointed will be required to join the company's superannuation scheme. Assistance can be given with housing in suitable cases.

Application forms and details may be obtained from:—

The Personnel Manager
AUTOMATIC TELEPHONE AND ELECTRIC CO. LTD.
Strowger Works, Liverpool, 7

1835

SALES ENGINEER

JOHNSON & PHILLIPS invite applications from men with suitable experience for a position as Technical Sales Engineer to sell the company's products, principally to industrial and trade purchasers, in the Manchester branch area.

Applications giving details of qualifications, experience and salary grouping should be sent to Sales Director, c/o Employment Department, Johnson & Phillips, Victoria Works, Charlton, London, S.E.7. 1859

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointments in the Transmission Department:—

FOURTH ASSISTANT ENGINEERS (Section).

Salary Class AX/DX, Grade 7, £810 × £25 to £935/£1,010 per annum plus London weighting.

The commencing salary will depend upon the qualifications and experience of the successful applicants, who will be required in the first instance to reside in the vicinity of Romford, Essex.

Applicants should preferably hold a Corporate or Graduate Membership of the Institution of Electrical Engineers, or equivalent qualifications, and have experience in the construction or operation and maintenance of high-voltage overhead lines, cables and substation equipment up to 132 kV.

Apply by 18th January, 1958, quoting Reference No. 2/8770, stating age, details of qualifications and experience, to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts.

W. N. C. CLINCH,
Controller. 1841

'ENGLISH ELECTRIC'

PROFESSIONAL Engineering appointments are available with this Group on a range of manufacturing, design and application engineering duties on all classes of electrical equipment and on hydro-electric work. Experience in electrical manufacture and power generation equipment is the qualification sought, and professional engineers in any of these fields are invited to apply for consideration.

A number of vacancies also exist for trained engineers seeking an opportunity of acquiring further experience and scope in this class of work, and particularly for Transformer and Switchgear Engineers.

All appointments are pensionable after a short qualifying period.

Apply stating age, experience and qualifications to Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting Ref. ER.418D.

1912

KODAK LIMITED

require

SHIFT PLANT ATTENDANT

for feed water system including demineralisation plant in modern industrial power station. Previous experience desirable but not essential.

Basic rate 228s. 6d. plus shift allowance and merit rating scheme in operation together with free life insurance, sickness benefit and pension plans.

Please write or call:—

Men's Personnel Dept.

KODAK LIMITED,

Wealdstone, Harrow, Middlesex.

1903

ROYAL NAVAL SCIENTIFIC SERVICE

requires PHYSICISTS, ELECTRONIC ENGINEERS and MATHEMATICIANS for 25 Senior Scientific and Scientific Officer posts at establishments in London area, Baldock, Harwell, Haslemere, Poole, Greenock and Rosyth.

Also required: MECHANICAL ENGINEER for work on heat transfer problems at Harwell. MECHANICAL ENGINEER for work on fuel and lubricating oil problems, in London area. MECHANICAL ENGINEER for work on gas turbine and problems in London area. CHEMICAL ENGINEERS for London area and Poole. METALLURGISTS for Rosyth and Poole. CHEMISTS (physical and inorganic) for Poole and Baldock.

Candidates must normally be natural-born British subjects of natural-born British parents, with at least First or Second Class Honours degrees or equivalent high professional attainments. S.S.O.s must have had at least three years' postgraduate experience and be 26 years of age.

Salaries (men): S.S.O. £1,190-£1,410; S.O. £635-£1,110 (London); somewhat lower in Provinces. Appointments are unestablished (with F.S.S.U. benefits), but opportunities may occur for those under 32 to compete for unestablished posts.

Forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting A.363/7A. 1874

METROPOLITAN-VICKERS ELECTRICAL CO. LTD.

Transformer and Rectifier Design, Development and Application Engineers

THERE are vacancies at the company's new factory at Wythenshawe for Senior and Junior Design, Development and Application Engineers in the fields of :—

LARGE POWER TRANSFORMERS.
INSTRUMENT TRANSFORMERS.
MERCURY ARC AND GERMANIUM RECTIFIERS.

Minimum qualification required is the Higher National Certificate. Candidates who have little or no transformer experience are invited to apply as training will be given, where necessary, to successful applicants. Commencing salary will be according to age and qualifications.

There are good transport facilities to this new factory, where working conditions are ideal.

Applicants are requested to write, quoting reference J.10, to :—

Personnel Manager
METROPOLITAN-VICKERS ELECTRICAL CO. LTD.
Trafford Park, Manchester, 17 1878

RANCO LIMITED

Tannochside, Uddingston, Glasgow, Scotland

Manufacturers of fractional horse-power motors, relays and controls for the refrigeration industry.

JUNIOR ELECTRICAL AND MECHANICAL ENGINEERS

A new Research and Development Laboratory is to be established near North Berwick on the East Lothian coast, and vacancies will exist for Junior Engineers. Applicants should possess H.N.C., but equal emphasis will be placed on individual enterprise and experience.

Generous salaries are envisaged for the right applicants and there is a contributory pension scheme.

Address enquiries to the Chief Engineer, giving details of age, experience, etc.

223

INSTRUMENT TECHNICIAN

required at the

ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL,

to inspect, test and calibrate a wide range of electronic, industrial and laboratory instruments.

An apprenticeship, or equivalent training, and good experience of electronic equipment (repair and calibration) required. National or City and Guilds Certificate desirable.

Salary £875-£1,050 (Tech. II).

Send POSTCARD to Recruitment Officer (978Y/48), A.E.R.E., Didcot, Berks., for application form and details. 1830

WARWICKSHIRE EDUCATION COMMITTEE

Rugby College of Technology and Arts

APPLICATIONS are invited for the following vacancies in the department of the College dealing with industry-based full-time sandwich courses for degree and diploma qualifications.

(1) LECTURER in ELECTRICAL ENGINEERING with special qualifications in electrical machines.
(2) LECTURER in MECHANICAL ENGINEERING.

Applicants should have a degree and professional qualifications with industrial experience.

The above are posts in a rapidly expanding department with an assured recruitment of full-time students where unusual opportunities exist for industrial contacts and research activities.

Salary scale: Lecturers £1,200 × £30 to £1,350.

Forms of application and particulars may be obtained from the Principal, to whom applications should be addressed as soon as possible.

W. COOPER,
Principal.

Rugby College of Technology and Arts,
Eastlands,
Rugby.
January, 1958. 1911

PRESTON: HARRIS COLLEGE OF FURTHER EDUCATION

Principal :
H. Wilkinson, M.Sc.Tech., Ph.D., A.Inst.P.

APPLICATIONS are invited for the appointment of ASSISTANT LECTURER GRADE B in ELECTRICAL ENGINEERING to commence as soon as possible. Candidates should possess a degree or equivalent qualification with teaching and/or industrial experience, and will be expected to teach up to Higher National Certificate level.

Salary within the range £650-£1,025 according to qualifications and experience, with additions for degree and/or training.

Further particulars and forms of application can be obtained from the Principal, Harris College, Corporation Street, Preston, to whom they should be returned within 14 days of the appearance of this advertisement.

W. R. TUSON,
Clerk to the Harris Council.

Municipal Building,
Preston. 1832

SENIOR SUPERVISING TECHNICIAN

required by EAST AFRICAN LAND FORCES ORGANISATION for service with civilian staff in KENYA. Appointment on contract for one tour of 24-45 months in first instance. Salary scale (including inducement pay) £1,215 rising to £1,566 a year. Commencing salary according to age, qualifications and experience. Gratuity at rate of 13½% of total salary drawn. Outfit allowance £40 payable in certain circumstances. Free passages. Liberal leave on full salary.

Candidates, 30-50 years of age, must have served apprenticeship in electrical engineering, be able to supervise the inspection and repair of telecommunications equipment and instruments, and be fully conversant with military fire control and telecommunication equipment. Preference will be given to candidates who are Corporate Members I.E.E.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2C/42471/EF. 1917

ADMIRALTY

TEMPORARY PRODUCTION ENGINEERS, Bath and Portsmouth areas. Duties: production of mechanical, electrical and electronic equipment for H.M. ships and include design for production, advice on production methods and preparation of estimates. Recognised apprenticeship or equivalent training and possess a University Degree, A.M.I.Mech.E., A.M.I.E.E., or exempting qualifications. Age not less than 25.

Salary range Portsmouth area £780 at 25 to £1,215. Starting salary according to age up to £1,055 at 34. (Bath area slightly lower.)

Forms, quoting C.777/7A, from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1. 1851

CENTRAL ELECTRICITY GENERATING BOARD

Research Laboratories, Leatherhead, Surrey

ASSISTANT ENGINEERS required to work on a wide range of problems associated with conventional and nuclear power stations. Present investigations concern heat transfer in nuclear fuel elements and heat exchangers, electrostatic precipitators, cooling towers and boiler feed pumps.

Candidates for Second and Third Assistant Engineer vacancies should have an honours degree with previous research experience; for other vacancies a pass degree or H.N.C. with appropriate experience would be acceptable, but importance is attached to ability to apply fundamental knowledge to a wide range of problems.

Salaries according to ability :—

Second Assistant,	£1,160 — £1,510 p.a.
Third Assistant,	£1,055 — £1,265 p.a.
Fourth Assistant,	£820 — £995 p.a.
General Assistant,	£550 — £725 p.a.

Application forms from S. S. Scott, Chief Personnel Officer, Central Electricity Generating Board, 24-30, Holborn, London, E.C.1, to be returned by 25th January, 1958. Quote Reference E.R./9A. 1853

INSTRUMENT ENGINEER

required by large oil company for work in Middle East. Applicants should have served a full apprenticeship and possess H.N.C.

The man selected will be required to calibrate and repair all types of electrical instruments governing the generation of electricity and the protection of circuits, both single and three-phase, including protective relays of all types, kilowatt indicators, kilowatt hour meters, kilovar indicators, power factor indicators, voltage regulators and frequency meters. In addition he would be responsible for the calibration and repair of test equipment such as A.V.O.s, Meggers, Selectest, etc.

Service will be on three-year contracts with pensionable pay not less than £1,050 per annum plus large local allowance. Paid home leave with free passages every two years. Fully furnished air-conditioned quarters at nominal rental. Bachelor preferred owing to shortage of married accommodation. Age limit 35.

Write giving full details, quoting No. 751, to Box No. 1886, c/o Charles Barker & Sons Ltd., Gateway House, London, E.C.4. 1850

WHOLESALE FITTINGS CO. LTD.

Electrical and Radio Distributors,
have the following vacancies :—

SHOWROOM ASSISTANTS.
Young men with experience of lighting fittings and domestic appliances.

TRADE COUNTER ASSISTANTS
with experience of electrical accessories and knowledge of current prices.

PRICING CLERKS
with experience in all types of electrical commodities.

Progressive vacancies in other departments for young men with experience of electrical wholesaling. Applications invited in confidence.

Apply in writing stating age and experience to

Staff Manager
WHOLESALE FITTINGS CO. LTD.
46/52, Commercial Street, London, E.1 1842

BRITISH KLOCKNER SWITCHGEAR LIMITED

Chertsey, Surrey

TECHNICAL SALES ENGINEERS required for London and Home Counties. Knowledge of motor control gear; sales experience preferred but not essential. Apply giving full particulars to—Managing Director. 166

Situations Vacant (continued)

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following posts:—

FOURTH ASSISTANT ENGINEERS, System Operation Department, Thames North Grid Control Area.

Salary N.J.B. Class AX/EX, Grade 8, £710 × £25 to £835/£935 per annum.

Applicants should have qualified to Higher National Certificate (Electrical) standard or should be completing studies to reach that standard.

Applicants should be prepared ultimately to undertake shift duties in the area grid control room.

Applications quoting Reference No. 2/8788, stating age, qualifications, experience and present position, should be sent within 10 days of the appearance of this advertisement to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts.

W. N. C. CLINCH,
Controller.

1894

M.K. ELECTRIC LTD.

LABORATORY ASSISTANT for electrical and mechanical testing and approval of electric wiring accessories and associated materials. Applicants should possess H.N.C. or equivalent, and must have had previous experience in a test laboratory. Should be qualified to work on own initiative preparing concise and accurate reports.

DESIGNER-DRAUGHTSMAN for design and development of electric wiring accessories. A high salary with good prospects for a senior designer with previous experience in this specialised branch of the electrical industry.

DRAUGHTSMAN for routine data and record work in connection with electric wiring accessories. Must be accurate and neat draughtsman preferably with previous experience of small electrical work.

Applicants should state age, education, experience and salary required, and all letters will be treated in strict confidence addressed to: ref. T.M., M.K. Electric Ltd., Wakefield Street, Edmonton, London, N.18. 1918

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

THIRD ASSISTANT COMMERCIAL ENGINEER required at the Board's No. 4 Sub-Area Headquarters, Rhostyllen, near Wrexham. Salary within the range £935/£995 per annum (N.J.B. K.10).

Applicants should have received a sound engineering training, and have had some experience in rural, urban and industrial development for the electricity supply industry.

They should be capable of advising on the general utilisation of electricity and in preparing quotations for the provision of supplies to all classes of consumers.

Some specialisation in public lighting and lighting design is desirable, also the ability to act in an advisory capacity to local authorities on lighting schemes.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager at the above address. Closing date 20th January, 1958. 1905

POWER STATION SHIFT ENGINEER

required by large oil company for service in Persian Gulf. Must have served apprenticeship with diesel engineers and have had running and maintenance experience of diesel alternators up to 1,750 kVA. Previous power station and load control experience an advantage.

Age limit 35. Bachelors preferred as no married accommodation available for first contract.

Emoluments over £1,500 p.a. (incremental) and at present no income tax; pension fund; paid home leave with passages.

Replies giving details and quoting No. 517 to Box No. 1883, c/o Charles Barker & Sons Ltd., Gateway House, London, E.C.4. 1913

WHIPP & BOURNE LTD.

Castleton, Rochdale

THE above company has a vacancy for a SENIOR ENGINEER with experience in A.C. and D.C. switchgear. He will be responsible to the Engineering Director for the organisation of the company's drawing office and should be interested in the development of equipment with which will be closely connected. This is a senior post and applicants must have had very considerable experience. A commensurate salary and pension is available. Apply to the Managing Director stating previous experience on low-tension A.C. and D.C. air circuit breakers.

A number of positions are also available for ESTIMATING ENGINEERS and SENIOR and JUNIOR DRAUGHTSMEN who have had previous experience on A.C. and D.C. air break switchgear. Posts are pensionable. Please apply to the Engineering Director stating present salary. 1790

MONSANTO CHEMICALS LIMITED

require a

SENIOR ELECTRICAL DRAUGHTSMAN

with experience of power, lighting and control installations in the chemical manufacturing or similar industries. Applicants, preferably with H.N.C. and practical background in electrical engineering, should be able to work on own initiative and in co-operation with design engineers.

The post is permanent and a good salary will be paid commensurate with qualifications and/or experience. Five-day week, staff restaurant and non-contributory pension scheme are in operation.

Applications in writing, giving full details of age, training, qualifications and experience, should be sent to the Chief Personnel Officer, Monsanto Chemicals Ltd., 10-18, Victoria St., London, S.W.1. 1767

DRAUGHTSMAN

required to join a small team engaged on the design and development of instruments for research in the oil industry at

THORNTON RESEARCH CENTRE
(near Chester).

Workshop experience, and some drawing office experience, on instruments or small electro-mechanical units is essential.

Five-day week and attractive pension scheme.

Write to
"SHELL" RESEARCH LTD.
Staff Department (R/D)
16, Finsbury Circus, London, E.C.2

1837

MUIRHEAD & CO. LTD.

Beckenham, Kent

DEVELOPMENT ENGINEERS for interesting work on development of Synchros and Servo Motors. In particular the vacancies require :—

(a) Qualified engineers with honours degree. Industrial experience not essential.
(b) H.N.C. with practical experience; or without academic qualifications but having a good engineering background.

Salaries commensurate with qualifications and experience. A pension scheme is in operation and the company has its own sports ground. Excellent recreational, social and canteen facilities.

Please write giving full particulars to the Personnel Manager. 1879

CABLE JOINTERS (OVERSEAS)

PLUMBER-JOINTER, 11 kV, required for 12-month contract in the Middle East. Write giving details of experience, together with names and addresses of past employers and dates, to—Box 1838.

COUNTY BOROUGH OF WOLVERHAMPTON

Assistant Electrical Engineer

APPLICATIONS are invited for the above appointment on Grade A.P.T. II (£725 rising to £845) in the Borough Engineer's Department. N.J.C. conditions of service. One month's notice. Superannuable post. Medical examination.

Applicants should be experienced in the design and preparation of drawings, specifications and estimates for and supervision of electrical installations for all types of public buildings. Candidates should have served an apprenticeship with a reputable firm and should hold a National Certificate or equivalent qualifications in electrical engineering.

Applications, stating age, qualifications, training and experience, naming two referees, to the Borough Engineer, Town Hall, Wolverhampton, by Monday, the 27th January, 1958. 1900

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

FOURTH ASSISTANT ENGINEER (Planning) required in the Department of the Sub-Area Engineer, No. 4 Sub-Area Headquarters, Electricity House, Rhostyllen, near Wrexham. Salary within range £790/£835 per annum (N.J.B. K/13).

Applicants should have had experience of the design, construction and operation of distribution systems, and a knowledge of the technical and economic factors in system layout and design. Technical qualifications desirable.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager at the above address. Closing date 22nd January, 1958. 1906

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

ASSISTANT ENGINEER is required at Hams Hall "B" Power Station, near Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K12, £835 to £880 per annum.

Applicants should have received a sound technical training and should preferably have had experience in the control of the works supply system. Appropriate technical qualifications will be an advantage.

Apply, quoting Vacancy No. 713MD, on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 21st January, 1958. 1854

ELECTRICAL AND MECHANICAL ENGINEERS AND DESIGNERS

LEADING firm of electric lift manufacturers, with head office in the Midlands, have progressive posts open to ELECTRICAL AND MECHANICAL ENGINEERS AND DESIGNERS, experienced in modern lift techniques and the design and development of control equipment.

All amenities, including pension scheme.

Apply in confidence, "For attention of Managing Director," to—

Box 1880

DESIGNER OF INDUSTRIAL LIGHTING EQUIPMENT

Applications for the above appointment are invited by

THE BENJAMIN ELECTRIC LIMITED.

Knowledge of fabricating techniques, finishes, lamps and control gear desirable, but initiative and ideas equally important.

The vacancy carries excellent prospects, with appropriate salary according to age, experience and qualifications. Staff luncheon room and pension scheme.

Apply Chief Technical Engineer, Brantwood Works, Tottenham, London, N.17.

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CENTRAL ELECTRICITY GENERATING BOARD

Central Purchasing and Contracts Department

APPLICATIONS are invited for the post of CHIEF PURCHASING AND CONTRACTS OFFICER. This officer will be responsible for buying the Generating Board's plant and buildings, equipment, materials, stores and services.

Applicants must have had extensive experience in the purchasing and contracting departments of a large industrial concern and must be used to negotiating major contracts and trade agreements.

The salary for the post is dependent upon qualifications and experience, but will be of the order of £5,000 p.a.

If you are interested in this important and interesting post please write personally to Mr. Ernest Long, Member for Finance and Administration, Central Electricity Generating Board, Bankside House, London, S.E.1, within 14 days of the appearance of this advertisement. 1895

NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE

Shakespeare Street, Nottingham

Principal: D. A. R. Clark, M.Sc.(Tech.), M.I.Mech.E.

APPLICATIONS are invited for the post of LECTURER IN ELECTRICAL ENGINEERING. Special interest and industrial experience in electrical power engineering desirable.

Salary in accordance with the Burnham Technical Scale as follows:—£1,200 rising by annual increments of £30 to £1,350 per annum.

Further particulars and form of application may be obtained from the Principal. Completed forms should be returned not later than 24th January, 1958. 1901

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

FOURTH ASSISTANT ENGINEER (Planning) required at No. 2 Sub-Area Headquarters, Sandiway House, near Northwich, Cheshire. Salary within range £790/£835 per annum (N.J.B. K/13).

Applicants should have had experience in overhead and underground distribution work. Technical qualifications desirable.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager at the above address. Closing date 22nd January, 1958. 1907

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

CONSUMERS' ENGINEER required at Chester. Salary £885/£930 per annum (N.J.B. G/8). Applicants should have technical training, a wide knowledge of electrical appliances, domestic and commercial utilisation, tariffs and consumers' contracting enquiries.

Appointment subject to medical examination. Pension scheme.

Applications, on forms obtainable from the Manager, No. 3 Sub-Area, Electricity House, Newgate Street, Chester, must be forwarded not later than 22nd January, 1958. 1904

MANUFACTURERS OF MEDIUM-VOLTAGE

Airbreak Switchgear and Motor Starter Equipment require :—

1. DEVELOPMENT ENGINEER.
2. PRODUCTION MANAGER.

Degree or H.N.C. standard desirable; salaries commensurate with qualifications and experience; pension scheme, etc.

Apply in first instance to—Box 1858.

LONDON COUNTY COUNCIL

Poplar Technical College

LECTURER required for Electrical Engineering and Physics Department. Burnham F.E. salary scale £1,200 × £30 to £1,350 plus London allowance.

Application forms from Secretary at College, Poplar High Street, London, E.14, to be returned by 25th January, 1958. (2380) 1914

MOBIL OIL COMPANY LIMITED

invites applications for the position of MAINTENANCE ELECTRICAL ENGINEER at the Coryton Refinery.

Applicants should have had experience in the maintenance of electrical equipment, including electric motors, switchgear of all types, mains up to 11,00 volts and power station equipment. Previous experience in actual refinery work, coupled with recognised technical qualifications, would be an advantage.

Modern housing available.

Applications, giving full details of qualifications and experience, should be addressed to the Employee Relations Superintendent, Mobil Oil Company Limited, Coryton Refinery, Stanford-le-Hope, Essex. 1919

ELECTRICAL/ELECTRO-MECHANICAL DESIGN

A PROFESSIONALLY qualified Engineer is required at the ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL, in a section providing a design manufacturing and commissioning service to Research Divisions, to prepare basic designs and supervise all stages of production (including control and technical guidance of the section).

Salary £1,300–£1,740 (Engineer II). Housing, superannuation and excellent conditions.

Send POSTCARD to Recruitment Officer (1011Y/48), A.E.R.E., Didcot, Berks., for application form and details. 1829

ELECTRICAL WHOLESALERS

Well-kown company require

MANAGER

FOR THEIR COVENTRY BRANCH.

Applicants must be energetic and have thorough knowledge of the trade and internal administration. Knowledge of local conditions and industry desirable. Good salary and prospects, superannuation scheme.

Apply in confidence—

Box 1916

TRANSFORMER DRAUGHTSMEN

SENIOR and JUNIOR DRAUGHTSMEN with experience on power transformers in range 5 to 10,000 kVA required. Permanent positions offering good salary according to experience. Pension, life assurance scheme, etc. Evening and Saturday interviews can be arranged. Write stating age, experience and qualifications to :—

The Chief Engineer

BRYCE ELECTRIC CONSTRUCTION CO. LTD.

Kelvin Works, Hackbridge, Wallington, Surrey 1915

AGENT required by Midland electrical control gear manufacturers mainly specialising in motor controls, to cover Yorkshire and the North-East. Must be an engineer capable of discussing technical matters and have connections with machine tool and similar manufacturers.—Box 1861.

ARMATURE winder for all types A.C. and D.C. repair work. Good rate, bonus, five-day week, overtime, etc.—Lewis Electric Motors Ltd., Moor Works, Blackamoor Lane, Maidenhead, Berks. 142

ASSISTANT electrical engineer required by steel tube manufacturers in Birmingham, to be responsible for all electrical maintenance and repairs, including a large number of overhead cranes and other lifting appliances, total load 7,000 kVA. Applicants must be between the ages of 24 and 30, have a university degree or equivalent, and have served a recognised apprenticeship or training for at least 3 years in electrical engineering. Contributory pension scheme. Apply stating age, qualifications, experience and salary required to—Personnel Manager, Tubes Limited, Rocky Lane, Aston, Birmingham, 6. 1839

ASSISTANT electrical planning engineer for factory layout organisation of group of manufacturing companies. Works trained. Preferably to H.N.C. level, experienced in L.T. and H.T. distribution and/or generation, lighting, power and automatic control design, estimating or supervision. Salary £800–£900.—Box 1862.

ARON ELECTRICITY METER Ltd. invite applications for the position of indoor sales engineer. Applicants are required to have a sound technical background, preferably applied to electricity meters and electronic equipment. Superannuation scheme in operation. Applicants should supply full details of experience, age and salary required, and replies, which will be treated in the strictest confidence, should be addressed to the General Sales Manager, Aron Electricity Meter Limited, 72-82, Salusbury Road, London, N.W.6. 1888

BOOTS PURE DRUG Co. Ltd. require engineering draughtsmen for the preparation of electrical installation schemes and specifications, as required for retail shops. 5-day week, good canteen facilities, contributory superannuation scheme, 2 weeks' holiday with pay, increasing to 3 weeks. Applications, in writing, giving experience and qualifications to Personnel Manager, Station Street, Nottingham. 1863

CABLE production manager required by expanding company in the electrical industry to take charge of production of V.I.R., T.R.S., plastic, lead-sheathed and armoured cables. Previous experience of organising cable production and controlling labour essential for this executive appointment. Energy, drive and first-class health essential; knowledge of time study and cost control an advantage. Applications, giving all relevant details, including present salary, should be addressed "Confidential," to the Works Executive Director, Aerialite Ltd., Castle Works, Stalybridge. 1881

CIRCUIT design draughtsmen required by company manufacturing industrial control equipment. Good salaries paid to "first-class" men. Canteen facilities, pension scheme. Housing assistance considered in approved cases. Write giving age, experience, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Works, Inverness Road, Hounslow, Middx. 273

CROMPTON PARKINSON Ltd., Chelmsford, Essex, invite applications for the position of indoor sales engineer. Applicants would be required to handle enquiries for rotating electrical plant and control gear up to 1,500 h.p./kW, and must have had a sound engineering training and preferably experience in preparing tenders for plant required in power stations, factories and similar installations. Five-day week; contributory superannuation scheme. Please write giving age and details of education and experience to — Personnel Officer. 1731

DESIGN draughtsman for jig, tool and component design. Senior staff position offering excellent prospects for the applicant with the desired qualifications. Apply stating age, experience, qualifications and present salary to Backer Electric Company Ltd., Rotherham. 1882

DESIGNER-draughtsman required, experienced in L.T. switchgear layout and fabrication of sheet steel control panels. Knowledge of power and control circuits required. The position entails considerable responsibility and ability to work with minimum supervision, in a small organisation manufacturing switchgear and allied apparatus. Permanent position, pension scheme. Apply — Chief Engineer, Astral Switchgear Ltd., Alma Road, Enfield, Middx. 1844

DEWHURST & PARTNER Ltd. require technical estimator for preparing tenders in their estimating engineering department. Applicant must have good electrical engineering background and have basic knowledge of motor control equipment and its applications. The position is a senior one, and housing assistance will be given to successful applicant if necessary. Canteen facilities, pension scheme. Write giving age, experience, etc., to — Personnel Officer, Dewhurst & Partner Ltd., Inverness Works, Inverness Road, Hounslow, Middlesex. 274

DRAUGHTSMAN required in expanding design and development section of switchgear manufacturers. Previous switchgear experience and a good technical background necessary. A.E.S.D. rates of pay and bonus scheme, non-contributory superannuation scheme also in operation. Assistance with housing available if necessary to successful applicant. The company is situated in pleasant country surroundings within six miles of the Devon coast. Write, stating experience, age, etc., to—Ottermill Switchgear Ltd., Ottery St. Mary, Devon. 1920

DRAUGHTSMEN for South Manchester office; interesting work on layouts and diagrams, 33 and 11 kV, switchgear, transformers, cables, etc. Apply—South Wales Switchgear, 3, Hawthorn Lane, Wilmslow, Cheshire. 1921

***Situations Vacant** (continued)*

ELECTRICAL test engineers are required at the E.D.A. Testing House, Leatherhead, Surrey, where this national institution has modern laboratories which test for safety and performance all types of domestic appliances, agricultural and light industrial equipment on behalf of the Electricity Boards and the British Standards Institution. Applicants should have previous experience in an electrical testing laboratory and a knowledge of the design of domestic electrical appliances would be advantageous. Higher National Certificate or similar qualification is required. Salary within the range £810/£935 per annum. Canteen facilities are available and there is a voluntary pension scheme. Write, stating age, qualifications and experience, to — Director, British Electrical Development Association, 2, Savoy Hill, London, W.C.2. 1864

ELECTRICIAN wanted for occasional small contract jobs.—HOLborn 8622. 1845

ELECTRO-mechanical draughtsmen required for production drawing office of company engaged in the manufacture of control gear equipment. Good salaries paid to "first-class" men. Canteen facilities, pension scheme. Housing assistance considered in approved cases. Write giving age, experience, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Works, Inverness Road, Hounslow, Middx. 275

ESTIMATOR required by Service Electric Co. Ltd. Must be capable of preparing complete schemes for industrial installations and experienced in public authority work. Reply to —Honeypot Lane, Stanmore, Middx. 1922

EXHIBITION organiser's assistant. A male assistant organiser, age 25 to 28, with experience of the electrical industry, is required in the Exhibition Office of the British Electrical Development Association. Duties involve records, progressing, reports and liaison with electrical manufacturers and stand-fitting contractors, in relation to planning the Association's electrical exhibits at national shows and exhibitions. A knowledge of electrical appliances selling and display desirable. Salary £680 × £20 to £740 p.a. plus London allowance; pension scheme; staff canteen; good prospects for advancement. Write stating age, qualifications and experience to — Director, E.D.A., 2, Savoy Hill, London, W.C.2. 1865

EXPERIENCED electrician required to take charge of running and maintenance of back pressure turbine power station and ancillary motors, etc., in paper mill. House available. Apply—Witchampton Paper Mills Ltd., Witchampton, Wimborne, Dorset. 1768

FOREMAN electrician required to supervise and maintain electrical installations and plant. Age 30/40. Pension scheme. Excellent prospects. Southall area. Apply — M. D., Taylor Woodrow Plant Company Ltd., Taywood Road, Ruislip Road, Greenford, Middx. 1877

FOSTER TRANSFORMERS Ltd., South Wimbledon, London, S.W.19, have vacancies for testers for work on all types of transformers up to 3,000 kVA. Applicants should have had some training or experience in the electrical industry. Apply in first instance giving details of experience and salary required to the Personnel Officer. 1840

H. J. HEINZ Co. Ltd. have a vacancy for a draughtsman for electrical services. Applicants should be aged 25/40, with a minimum of 5 years' drawing office experience, and be familiar with all aspects of main and subsidiary electrical services, and should preferably be of H.N.C. standard. Please apply to the Personnel Officer, H. J. Heinz Co. Ltd., Waxlow Rd., Harlesden, London, N.W.10. 1883

JUNIOR draughtsman required. Some electrical knowledge desirable but not essential. Apply—L. Weekes (Luton) Ltd., Wingate Road, Luton, Beds. 1923

LONDON consulting engineers require electrical engineers for installation design for hospitals, commercial buildings, schools, etc. Write stating age, qualifications, experience and salary required to—Box 160.

MOTOR control gear sales engineer required for South Wales. Applicant should be aged 25-35, with a good technical and practical knowledge of contactor motor control gear and with some successful selling experience or a real aptitude for sales work.—Box 1884.

PROVINCIAL engineering firm requires senior estimator/supervisor for electrical contracting department. Office trained with practical experience. Write age, experience, references.—Box 9228.

OPPORTUNITY for considerable future advancement. Electrical wholesale company require male or female assistant at head office, London, W.1. Good at figures. Previous electrical trade experience desirable but not essential. Five-day week. L.V.s. Salary by arrangement. Reply in strict confidence to—Box 1885.

PRICING/order clerk with sound knowledge of electrical trade required by expanding E.W.F. wholesalers. The successful applicant will command a high salary and his prospects are only limited by his own ability. Write with full details—H. J. Golding & Co. Ltd., 138, Plough Road, London, S.W.11. 1866

PROGRESSIVE electrical cable manufacturers in the North-East of England have a vacancy for an electrical assistant in the research and development department. The work is of an interesting and varied nature and applicants should have a scientific and/or electrical background. Please write stating your age, qualifications and experience to Research Manager.—Box 1793.

REFRIGERATION engineer required for service in British West Africa. Applicants must be under age 35 and must have had experience of installation and servicing of refrigeration equipment. A knowledge of air conditioning equipment would be an advantage. Commencing salary would be not less than £1,000 per annum. In addition there are family allowances, free furnished accommodation, free passages, and medical attention in Africa. Tours of about 21 months each followed by substantial leave in U.K. on full pay. Pension fund. Apply to Box 1846, giving full particulars.

SALES engineer for Gloucestershire and Wiltshire required by E.W.F. wholesalers. Applicants should have practical experience in contracting or as works engineer. Car provided. Reply stating age, experience and salary required to—Box 9225.

SALES engineer required for London and Home Counties. Good position for man with experience and energy, selling transformers and rotating machinery. Pension scheme. Apply stating full particulars—Ref. PM, Veritys Ltd., Brettenham House, Strand, London W.C.2. 1847

SALES manager. An established and expanding company manufacturing domestic electric appliances wish to appoint a sales manager to operate from works in Berkshire and office in London. The appointee will be an experienced and adaptable appliance salesman capable of promoting, on a limited budget, home and export sales of attractive and established lines. A starting basic salary of up to £1,000 per annum is offered with very worthwhile prospects for the right person. Write giving full details to Managing Director.—Box 1924.

SALES representative required by E.W.F. electrical wholesalers for S.W. London. The successful applicant, whose remuneration will be by salary, commission and expenses, must enlarge a substantial existing connection and must, under experienced direction, be capable within a period of earning a four-figure income. Write with full details to—H. J. Golding & Co. Ltd., 138, Plough Road, London, S.W.11. 1867

SALES representatives required for North, Midlands and South of England areas for company manufacturing full range of electricity meter products. Applicants should have good administrative ability and personal contacts at all levels in this field of sales. Applicants should supply full details of experience, age and salary required. Sales commission, car allowance and superannuation scheme. Replies, which will be treated in the strictest confidence should be addressed to the General Sales Manager, Aron Electricity Meter Limited, 72-82 Salusbury Road. London, N.W.6. 1886

SHIFT inspector-testers. Vacancies occur in laboratory and plant controlling chemical and plating processes. The work is on a shift basis and suitable applicants will be trained for light interesting work. Previous inspection experience desirable but not essential. Excellent canteen and recreational facilities and a good rate of pay can be obtained after training. Applications in writing should be made to the Labour and Welfare Officer (Oldbury), Messrs. Albright & Wilson (Mfg.) Limited, P.O. Box No. 3, Oldbury. 1903

SWITCHGEAR sales engineer required to handle enquiries and orders for power and substation switchgear. Applicants should preferably have attained H.N.C. standard and have had previous switchgear experience. Write—Personnel Officer, Ferguson Pailin Ltd., Higher Openshaw, Manchester, 11. 1824

SERVICE engineers required for company manufacturing full range of electricity meter products. Experience of electricity meters desirable but not essential. Applicants must have sound technical background and be prepared to travel throughout the British Isles. This position offers first-class opportunities for further advancement. Applicants should supply full details of experience, age and salary required. Car supplied and superannuation scheme. Replies, which will be treated in the strictest confidence, to be addressed to the General Sales Manager, Aron Electricity Meter Ltd., 72-82, Salusbury Road, London, N.W.6. 1887

SOUTH Wales electrical contracting company require the services of a progressive branch manager. This is a post of considerable responsibility and remuneration will be agreed accordingly. Applicants must at present be engaged in the management of an electrical contracting office or be completely familiar with such duties; and preferably to normally be resident in South Wales. Your applications will be dealt with in the strictest confidence. Please reply in the first instance to Box 1794, giving full chronological details of your experience.

SOUTH WALES SWITCHGEAR Limited require a representative for Scotland, generally to be based at the new factory in Glasgow, but to deal with all outside sales for the Scottish territory. Applicants should have good contacts in the electricity supply industry and some knowledge of industrial requirements for switchgear and transformers. Applicants suitably qualified are invited to reply to the General Manager, South Wales Switchgear Ltd., Blackwood, Monmouthshire, giving details of age, experience and salary required. 1870

STOREKEEPER with sound knowledge of electrical trade required by E.W.F. wholesalers. Good prospects. Write with full details —H. J. Golding & Co. Ltd., 138, Plough Road, London, S.W.11. 1868

TECHNICAL correspondent required by company manufacturing electronic control equipment. Duties to cover technical sales correspondence and installation manuals. Technical knowledge essential, with ability to initiate installation diagrams and operating drawings. This is a new position arising from expansion and offers considerable scope. Superannuation benefits apply after a probationary period. The company has a modern factory with canteen facilities. Write giving full details of previous experience and salary required to—Radiovisor Parent Ltd., Stanhope Works, High Path, London, S.W.19 (Tel. Cherrywood 3351). 1871

TELEPHONE mechanic/engineer, first class, required large firm engineers, 12 months' service overseas. Excellent opportunity. Write age, experience.—Box 1872.

TESTER of automatic electric control equipment required. Interesting work with good prospects. O.N.C. standard preferred. Five-day week, pension scheme, canteen facilities. Please write giving full details of age, previous experience, qualifications, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 277

THE LINDLEY THOMPSON TRANSFORMER & SERVICE Co. Ltd., St. Mary's Road, Slough invite applications from sales representatives of proved ability, who have a sound engineering knowledge of power transformers and have sales contacts with the C.E.A. and Area Boards. Experience in the preparation of tenders would be an advantage. The company operates a pension scheme and would give assistance regarding accommodation, etc. Applicants should state qualifications, experience and salary required. 1925

TRADE counter clerk with sound knowledge of electrical trade required to handle expanding department in E.W.F. wholesalers. Remuneration according to experience with good prospects. Write with full details—H. J. Golding & Co. Ltd., 138, Plough Road, London, S.W.11. 1869

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

SALES engineer, age 41, A.M.I.E.E. Home and overseas experience. Open to offers, London preferred.—Box 9224.

ELECTRICAL contractors' London manager seeks change of situation. Experienced preparation of tenders, schemes and final accounts for all classes of electrical work. Particularly keen to secure managerial or executive post with established company desiring improved organisation. Able to introduce new business if required. Advertiser's private secretary wishes to accompany him when moving. Please apply—Box 9227.

ELECTRICAL engineer requires part-time work. Factory maintenance or power installations preferred. Fully experienced industrial and commercial installation design, estimating, supervision, and would consider this type of work. Greater London area.—Box 9230.

SALES representative requires position. Excellent connection with industry from Birmingham to Dounreay, including ship building on Tyne and Clyde. All correspondence answered.—Box 9231.

ARTICLES FOR SALE

DIESEL ALTERNATOR SETS

400/440 volts, 3-phase, 50 cycles

500-kVA PETTER "SS" vertical 6-cyl. water cooled Engine. Comp. air start. BRUSH Alternator. Auxiliaries, control gear, etc. 600 r.p.m.

250-kVA PETTER "SS" vertical 3-cyl. water cooled Engine. Comp. air start. BRUSH Alternator. Auxiliaries, control gear, etc. 600 r.p.m.

187-kVA WAUKESHA vertical 6-cyl. radiator cooled Engine. Eng. start. G.E.C. Alternator. Control gear. 1,000 r.p.m.

162.5-kVA CROSSLEY vertical 6-cyl. water cooled Engine. Comp. air start. L.D.C. Alternator, control gear. 500 r.p.m.

125-kVA NATIONAL vertical 6-cyl. radiator cooled engine. Comp. air start. BRUSH Alternator, control gear. 1,000 r.p.m.

100-kVA MIRRLEES vertical 3-cyl. water cooled Engine. Comp. air start. G.E.C. Alternator, control gear. 600 r.p.m.

93.5-kVA BLACKSTONE vertical 3-cyl. water cooled Engine. Comp. air start. E.C.C. Alternator, control gear. 600 r.p.m.

68.8-kVA CROSSLEY vertical 6-cyl. water cooled engine. Elec. start. BRUCE PEEBLES Alternator, control gear. 1,000 r.p.m.

62.5-kVA McLAREN vertical 5-cyl. radiator cooled engine. Elec. start. BRUCE PEEBLES Alternator, control gear, 1,000 r.p.m.

58-kVA FOWLER vertical 6-cyl. radiator cooled engine. Elec. start. L.D.C. Alternator, control gear. 1,500 r.p.m.

50-kVA PERKINS vertical 6-cyl. radiator cooled Engine. Elec. start. METRO-VICK Alternator, control gear. 1,500 r.p.m.

37-kVA PERKINS vertical 6-cyl. radiator cooled Engine. Elec. start. HIGGS Alternator, control gear. 1,500 r.p.m.

27-kVA CROSSLEY vertical 3-cyl. radiator cooled engine. Hand start. CROM-PARK. Alternator, control gear. 1,000 r.p.m.

20-kVA LISTER vertical 3-cyl. radiator cooled Engine. Hand start. CROM-PARK. Alternator, control gear. 1,000 r.p.m.

14-kVA NATIONAL vertical 2-cyl. radiator cooled Engine. Hand start. B.T.H. Alternator, control gear. 1,000 r.p.m.

THOS. W. WARD LTD.
Albion Works, Sheffield
(Phone 26311, ext. 347; Grams, Forward). 322

GENERATORS

100 Unused 30-kW, 225-volt D.C. Generators by MAWDSLEY, compound wound, 960 and 1,440 r.p.m., Class 2, continuously rated, cowl ventilated.
First-class condition.
Immediate delivery covered by guarantee.

Lightweight Alternators for Portable Generating Sets

100 Unused 4-kVA, 230-volt, single-phase, 100-cycle Alternators, 3,000 r.p.m., self-exciting with automatic voltage regulators.
Immediate delivery with guarantee.
Alternators only ..... Price £30
Alternators with A.V.R.s Price £45

GEORGE COHEN SONS & CO. LTD.
Wood Lane, London, W.12
(Tel. Shepherds Bush 2070) and
Stanningley, Nr. Leeds
(Tel. Pudsey 2241). 1927

TRANSFORMER WELDERS

20/300 amps., 250 amps. and 160 amps.

OIL-cooled pattern Arc Welders for operation on 400/440 volts, single-phase, 50 cycles; alternatively 230 volts, single-phase, 50 cycles; dual welding voltage 50/80; output current variable between 20/300 amps., fitted with coarse and fine regulators in robust steel tank. £85.
Similar 250-amp. units. £71.
Similar 160-amp. units, but not fitted with wheels. £45.

GEORGE COHEN SONS & CO. LTD.
Wood Lane, London, W.12
(Tel. Shepherds Bush 2070) and
Stanningley, Nr. Leeds
(Tel. Pudsey 2241) 1926

VARIABLE SPEED COMMUTATOR MOTORS

h.p.	Make	Speed	Enclosure
45/15	L.S.E.	1500/500	D/Proof
40/8	B.T.H.	1150/230	S/Prot.
30/6.6	L.S.E.	2250/500	S/Prot.
18.5/5.5	B.T.H.	800/250	S/Prot.
18/4.5	HOLMES	1450/360	D/Proof
6/1.5	B.T.H.	1120/280	S/Prot.
4/1	B.T.H.	1650/413	S/Prot.

All 400/440 volts, 3-phase, 50 cycles.
Machines in first-class condition.

WHITEFIELD MACHINERY & PLANT LIMITED,
Cobden Street, Salford, 6
(Tel. PEN. 4746). 1928

REDUCE YOUR MAXIMUM DEMAND

NEARLY new WATFORD Load Control equipment at only 30% of new price. If you have adequate compressed air storage, arc furnaces, heat treatment furnaces, direct electrical heating and can shut off the equipment for a few minutes in any half-hour then this equipment will repay itself in a few months.
Contact—Box 1739.

ELECTRIC HOUSE SERVICE METERS

PREPAYMENT and credit, 200/250 v. A.C., 1/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
Fairfax Works, Fairfax Rd., London, N.8
(Tel. MOUntview 7944, 6373) 191

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A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

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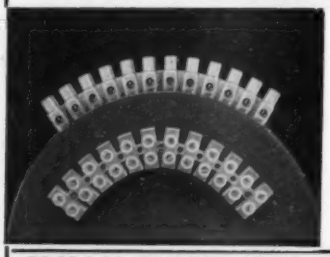

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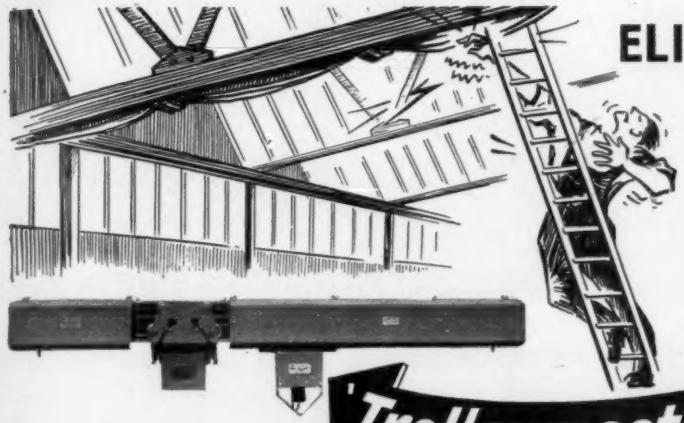

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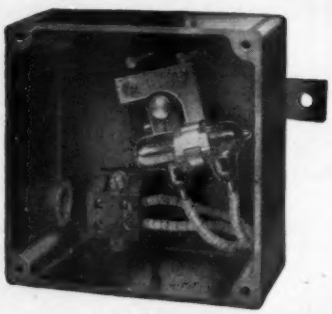

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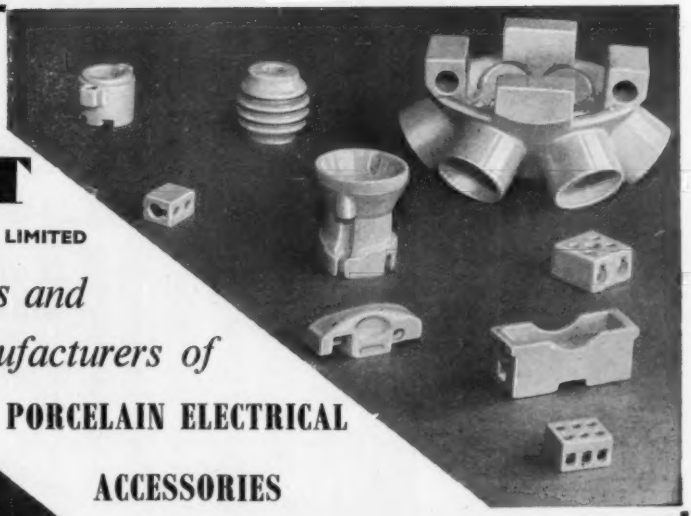

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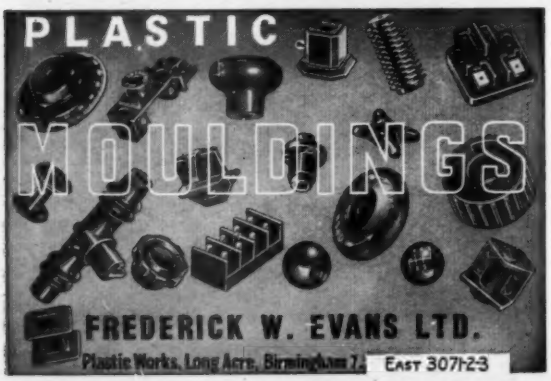

HOUSE SERVICE METERS

Credit Pattern
and Prepayment Type
200-240 v. A.C. S/Ph 50 c. (& D.C.)
AVAILABLE FROM STOCK
POLYPHASE 400-440 v. 3-Wire Type
Ex Stock

UNIVERSAL ELECTRICAL CO.
217-221 City Road London. E.C.1

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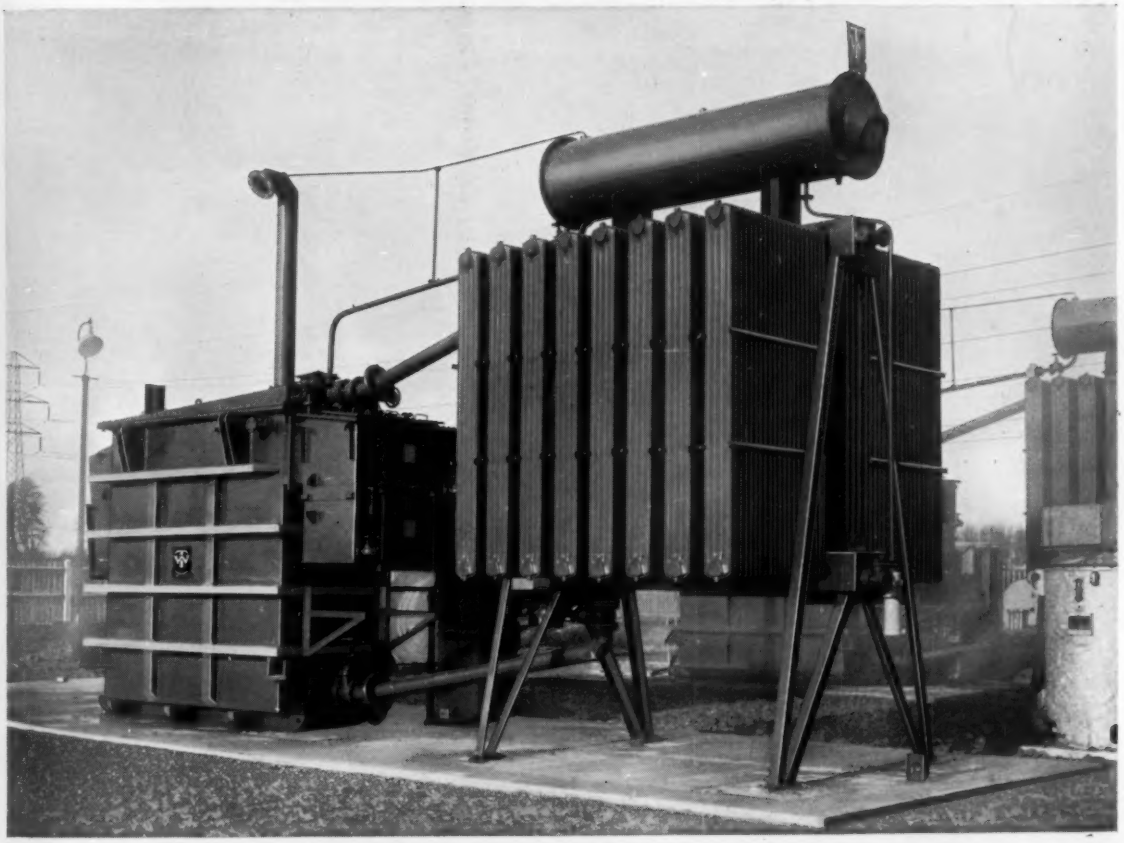


10,000 kVA, 33/11 kV. T.W. TRANSFORMERS
Fitted with On-Load Tap Change Equipment, supplied to the Eastern Electricity Board, and installed at Shenley Sub-station.

TRANSFORMERS (WATFORD) LIMITED

SANDOWN ROAD, WATFORD, HERTFORDSHIRE

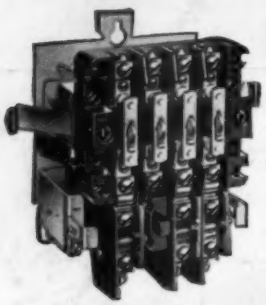
You can standardise on motor starters with MEM 'Autoline'

WHEN a new motor comes in you're never stuck for a starter if you keep a few MEM "AUTOLINES" in stock. The big advantage of the "AUTOLINE" is that it will provide overload precision protection for all motors rated between ¼ h.p. and 15 h.p.

The heaters are the only variable component involved and these can be selected from a range of 40 heaters to ensure precision protection for any motor up to 15 h.p. (25 amps. max.).

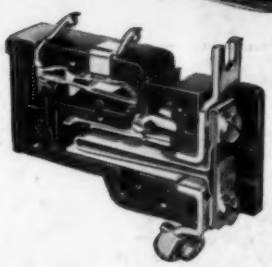
The MEM "AUTOLINE" is built to an advanced design produced by one of Britain's leading specialists in motor control gear. It has extra safety clearances and is substantially made in every detail.

Please send for Autoline Booklet No. 356(X).

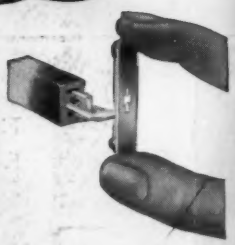


The Skeleton Pattern Units can be combined in various ways to meet a wide variety of different needs on machine tool applications.

Any MEM "AUTOLINE" starter can be changed from Automatic to Manual resetting operation in a few moments. A cover with "Reset" button only is available.



Exclusive new overload relay design with heaters specially designed for each rating means accurate protection under all conditions.



Contacts are of solid silver. Contact replacement is especially simple. Just flick over a spring catch and lift off.

MEM

MIDLAND ELECTRIC MANUFACTURING CO. LTD., TYSELEY, BIRMINGHAM, 11

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